TITLE: Business Architecture Tool (BAT):

Development and Assessment of a systems framework to guide organisations from concept to delivery, in terms of creating deeper and meaningful integration across processes and functions.

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Preface

The body of work assumed its final shape after many iterations, starting as a simple concept, rapidly became increasing complex with each revision. Gladly I have learned that this indeed forms part of the overall development and evaluation of such an endeavour. Initially the idea was to develop a systems tool to assist in the development of robust strategies for large programmes or organisations, however driven by client-needs to implement these strategies, the initial intention of an integrated strategic planning tool, moved toward an integrated intervention tool. Generally, root causes of programme failures range from simple capacity constraints, to more complicated reasons such as depth of understanding, inexperience, lack of leadership, poor integration; and limited strategic capacity, mostly borne from linear cause-and-effect paradigms prevalent in the SA public sector. The overall manner in which this body of work has been formulated, made it possible to address the issues identified in the exploration of the

literature and the practice of action research. The focus of the study was to assist organisations regarding the difficulties of “dynamic integration” i.e., deriving a systems-based implementation tool to improve integration from concept to delivery. Whether the questions and the answers provided here, constitute or reveal meaningful contributions to knowledge, is for the reader to judge. But, if the current discussions on postmodernism, new physics, artificial intelligence, complex adaptive systems, actor networks, organisational learning, knowledge management, are any indication, then the ideas and concepts developed in this thesis may be of some use.

Structure of the Thesis

The dissertation have two volumes, **Volume-1** have 6 chapters and is the key body of work. **Volume-2** contains all references; list of figures; and the detailed version of the prototype. This structure appeared necessary to retain the interest of the reader, whilst providing sufficient supporting detail, typical of the voluminous nature of longitudinal studies. Volume 1 however can be viewed as the complete thesis as it has been designed to be a stand-alone volume. The diagram below highlights the flow of the thesis, and has been repeated at the beginning of each Chapter, highlighting its purpose and content, so as to provide the reader with focus and output per chapter. Chapter headings are highlighted to provide additional guidance to the reader.

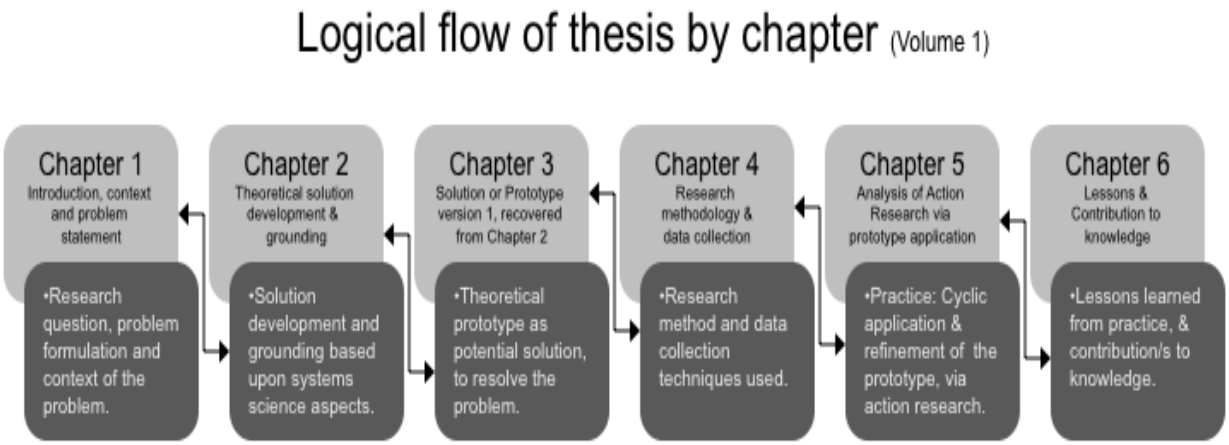


Figure A: Flow of thesis by chapter (Volume 1), highlighting outputs per chapter

Structure of Volume 1

Chapter 1 provide contextual and historical background to the body of work, and informs the reader of: (i) the socio-economic context; (ii) the nature of the problem and it's challenges; (iii) the problem relevance, it's aims and the intention of the work; (iv) it covers introductory aspects of the research strategy, method of enquiry, and data collection (detailed in Chapter 4).

Chapter 2 presents a review of the theoretical solution development and grounding, covering aspects such as: (i) the theoretical systems aspects that informed the development of the prototype; (ii) the specific systems elements recovered and "absorbed" to varying degree's in the prototype; (iii) the solution development or specifications; and (iv) Characteristics of the ideal solution for the SA context.

Chapter 3 provides an overview of the theoretical answer, or the prototype developed, covering: (i) the model proposition; (ii) the prototype attributes; (iii) the implementation methodology of the prototype; (iv) summary and key attributes of the prototype.

Chapter 4 details the research methodology and data collection techniques employed, expanding upon relevant techniques, their shortcomings and how to overcome these to ensure reliability and validity. It also provides the developmental approach, and logic for adopting an action oriented approach; including key aspects of action research debates, arguments and insights.

Chapter 5 covers the developmental approach and improvement of the prototype, based upon feedback from the field via interventions, covering: (i) cyclical research model; (ii) outcomes and insights from each cycle; (iii) the overall structure and process of the prototype development through practice; (iv) the insights gained from the action research cycles; (v) the themes and patterns recovered from the feedback and performance aspects in the field.

Chapter 6 is the conclusion of the work covering: (i) the lessons learned; (ii) the significance and potential contributions to the knowledge and potentially other broad research areas; (iii) the limitations and assumptions impacting the work.

ABSTRACT

This thesis is based upon a prolonged research period, wherein a practical systems based tool (prototype), was researched, developed and tested, so as to gain outputs of integration improvements for service delivery in South Africa (SA) specifically, and in general for developmental economies. The research question can be summarised as: "*to develop a systems-based intervention tool, able to provide practical integration improvements from concept to delivery*". Existing systems methods and approaches were accessed, and based upon their utility for the local context, were used to varying degrees, in "building" the prototype, which was tested across a number of interventions, categorised under "world of the client"; and "world of the designer" (firm created for this purpose). Being aware of local and international implementation challenges by virtue of experience as consultant for a number of governments, whereby national planning and implementation techniques tend to be embed mechanistic models of thinking directly affecting how agents and agencies: understand the problem; plan to resolve the problem; and implement the designed solutions. The research sought to recover key systems insights in order to build a practical tool that could reduce negative outcomes, perpetrated by well-intended reforms, having limited integrative thinking, planning and delivery. The research required long-term observation, reflection, and extensive literature review. A distinctive feature of the research is the account of the author's exploration of his learning and development, within

the context of external contextual pressures. As a result of my enquiry, I am able to make the following claims about the prototype, and my practice:

Claim Number 1

This thesis contributes to the professional knowledge-base of management in a description and explanation of how an agent (the designer/firm), within a dynamic landscape, asked, researched and answered questions such as: *How can I improve my own leadership and management in terms of practical system-based integration?*

Claim Number 2

The thesis makes an original contribution to knowledge in an analysis of the extent to how effective the prototype functioned in a live project environment, regarding *integration and service delivery*;

Claim Number 3

This thesis is an original study of an agent, in an agency, dedicated to improve his values in his practice, so as to *enhance his understanding, insights and integrity in context of a fluctuating landscape.*

CHAPTER 1: PROBLEM FORMULATION

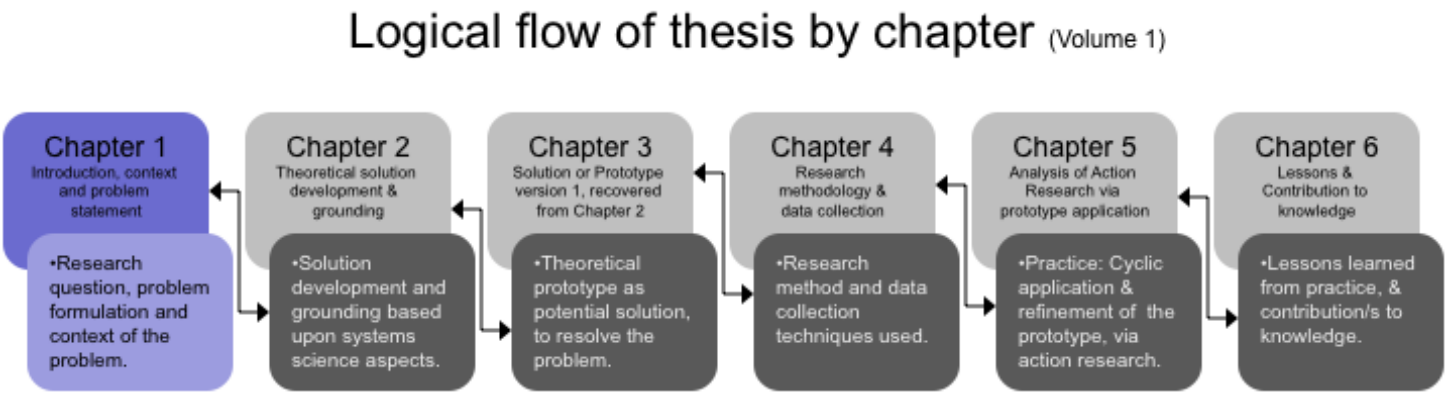


Figure A.1: Repeat of figure A, highlighting chapter specific focus and content

1.1 Concern regarding South African service delivery

Between 1929 and 1950, South Africa's per capita growth was the third fastest among the 23 developing countries (Moll, 1994), higher than the growth rates of industrialised economies, and catching up with the developed world (Moll, 1994; Dowrick and DeLong, 2005). South Africa had good growth from 1913 until 1950, by which time it ranked 10th (out of 31 countries) in GDP per capita. Then decades of relative stagnation and eventual decline, moved South Africa down to 18th (out of 33 countries) at its political transformation in 1994. Over this period of decline, South Africa dropped out of the "convergence club" (Dowrick and DeLong, 2005), as predicted by liberal economists whereby apartheid would exact such economic penalties since long standing costs of apartheid arose from the low level of labour productivity (apartheid education impacted productivity

of black labourers, shielding white labourers from competition); reliance on quota and tariff protection; separate development and a host of inefficient homeland practices (Nattrass, 1991; Fallon and Pereira de Silva, 1994; Moll, 1994; Bruggemans, 2003; Feinstein, 2005). Thus setting up the long-run economic slide, culminating in the international sanctions against South Africa.

The economic growth in the ten years since 1994, had marginal improvements relating to the very poor, and is by far insufficient to maintain the successful political transition. Prudent economic policies have contributed to stability, with the institutional environment becomming consistent and efficient, to support a more aggressive growth rate, and improvement in Property rights; Open trade and investment regulations; Market friendly business regulations (Stewart, 2000). The unique history and structural challenges in South Africa, makes for great debate, reflected in the myriad of opinions, however local structural elements include a society that is extreme in its heterogeneity, with segmentation along both racial and income divides. In particular, before the collapse of apartheid in 1994, the black population received less than 50% of the national income, which had risen to 75% in 1995 (Stewart, 2000). The spatial dimension of apartheid meant that millions of South Africans were deliberately located miles away from jobs at urban centre's (inhumane and inefficient migrant worker systems), resulting in transport and other structural patterns that remain in place today.

Discrimination in the provision of education and training opportunities meant that generations of black South Africans were prevented from acquiring the skills, to allow the pursuit of productive employment opportunities. Despite these very real and seemingly insurmountable challenges, South Africa seem to have stood firm on its macro-economic issues, which have translated into a very decent platform from which to proceed. The structural duality of the South African economy further impinges growth and employment challenges, resulting in the uneasy co-existence of a modern economy, next to pervasive underdevelopment and persistent poverty (e.g. unemployment at 36 percent total labour force in 1999 (Stewart, 2000).

Analysts believe that growth and job creation models should appreciate that different production activities and technologies involve very different patterns of labour use and skill intensity; equally important are the limitations imposed by resource constraints: no matter how attractive it might appear to expand labour-intensive activities, if crucial complementary inputs (capital, management capacity) are in short supply, the short-run potential for employment creation will be limited. The SMME sector in South Africa is underdeveloped, constrained by inadequate demand, limited access, high cost of capital, and relatively weak support and procurement programs from Government. Labour market flexibility is often cited as a critical concern, but efforts to introduce changes in labour legislation to offset “unintended” employment consequences, proved

contentious and illustrate difficulties in reforming labour market institutions and practices. Efforts must also be made to augment the skills base of the labour force, to improve their employability and productivity, with both large and SMME firms citing skills shortages as one of the most critical constraints to expansion. Accelerating rural development can also provide a source of dynamism, whereby South African agriculture have undergone substantial structural change, with evidence that administrative difficulties associated with land reform have slowly being reduced.

On a regional level, the Sub-Saharan poverty is one of the most obdurate features of the world economy. For the entire post-industrial revolution period, Africa has been the world's poorest region and also its slowest growing (Maddison, 1996). Debates suggest factors frequently invoked to account for Africa's poor socio-economic performance (Bloom & Sachs, 1998): Legacy conditions - slave trade, colonial rule, and Cold War manipulations of African politics; Dependence - on small number of primary exports, causing trade decline and volatility; Internal political landscape - authoritarianism, corruption, and political instability; Economic policies - protectionism, statism, and fiscal profligacy; Demographic change - rapid population growth; Social conditions - deep ethnic and religious divisions in African society, with low levels of "social capital" as variously measured; Geographic disadvantage - has also been blamed for the slow development. Figure 1.1 below put's into perspective the magnitude of the

challenges faced by South Africa, highlighting challenges at 3 systemic levels:

The individual level (poor education, inexperience, limited leadership, lack of creativity and innovation); it highlights the challenges at the societal level (fear of change, cultural diversity, lack of national unity, separate development legacy); it also highlights the national challenges (globalisation, uncompetitive practices, lack of innovation, scant resources, limited manufacturing base). All of the above being part of the unique South African context. A key consideration, particularly at the individual and societal level, is the notion of Bourdieu's Habitus (1991, 1975). To the author, it highlights the scale of the challenge, and suggest that the escape trajectory from poverty for the masses of South Africans are indeed system-wide. This must be further contextualised in terms of the political promises made regarding the national developmental plans since the 1994 liberation. This rich-picture also touches upon root causes impacting the local challenges in terms of the socio-political vision of rapid delivery.

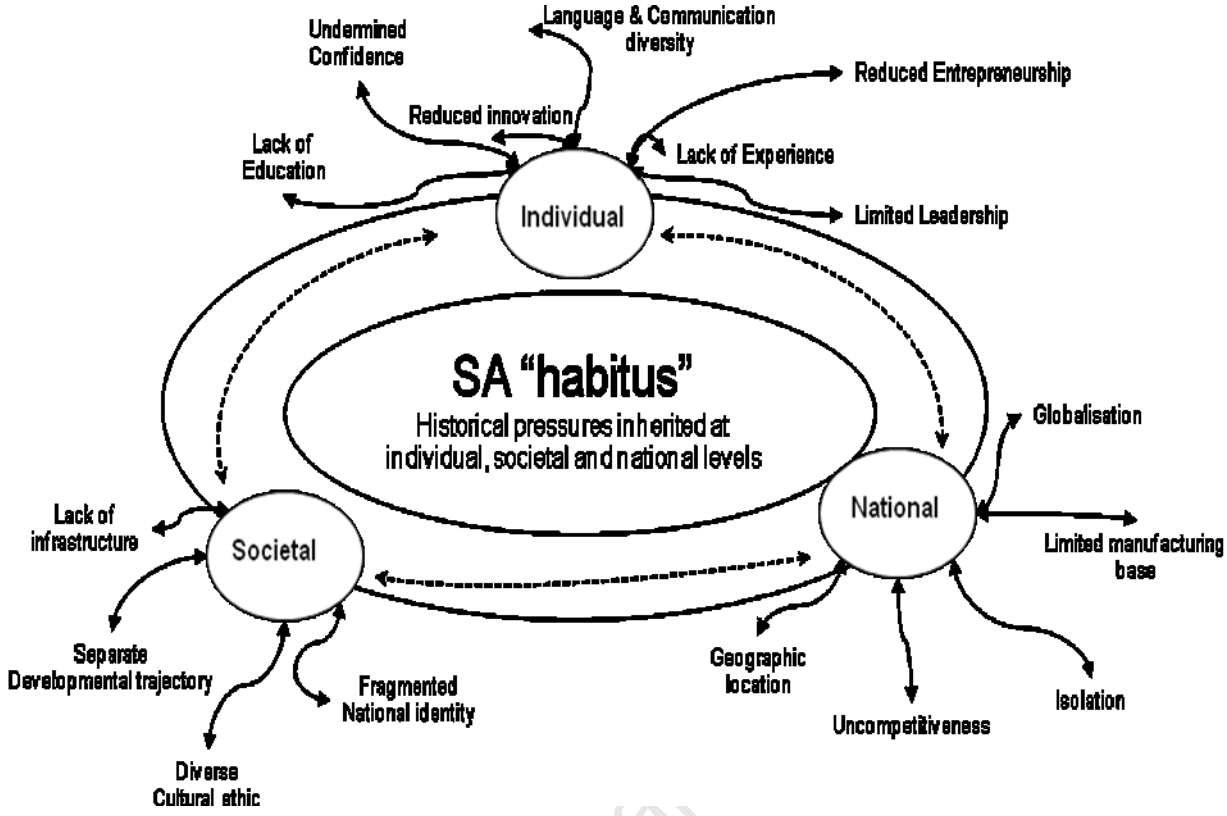


Figure 1.1 South African challenges impinging development & delivery

When incorporating the notion of Habitus (Bourdieu, 1991, 1975) at the individual (lack of education, undermined confidence, little innovation, lack of experience); and societal level (fragmented culture, national identity), with the added dimension of national developmental challenges, the rich picture provides for a daunting task. It is the author's view that these considerations are not planned and accommodated for in national interventions, resulting in divergent outcomes. It lay's bare the research question of why, despite sound macro and policy environment in SA, we have severe implementation and delivery challenges, most notably from the public sector. In this sense, Bourdieu's "Habitus" expresses the manner in which we "become ourselves", i.e. how we develop preferences,

attitudes and opinions and how we engage in practices. The manner in which society is regulated in this regard is explained through the notion of "field of power", Bourdieu's metaphor for how cultural fields conduct themselves (how individuals and institutions in dominant "fields" relate to each other). The "field of power" is said to operate as a configuration of capital (Economic capital, Cultural capital and Symbolic capital), whereby agents in the field adjust their expectations with regard to the capital they are likely to attain in terms of the "practical" limitations imposed upon them by their place in the field (e.g., education, social connections, and class position).

Those having the least capital tend to be less ambitious, and more "satisfied' with their "status", leading to sustained symbolic domination, and reproduce the conditions of oppression (Bourdieu, 2000). There are the odd cases that may be different, but he insists that such "gambling" for improved capital, by the agents in the field, are largely doomed to failure. Although lower class agents may strive to get their offspring educated, the Habitus of the children will, in advance, disqualify them from success, where the children will display their Habitus, suggesting the children themselves recognise this, and more or less expect failure. "Those who talk of equality of opportunity forget that social games… are not "fair games". Without being, strictly speaking, rigged, the competition resembles a handicap race that has lasted for generations" (Bourdieu, 2000).

This work adopts Bourdieu's "complete" notion of Habitus, to mean the social rules and norms agents and agencies tend to subconsciously obey. This is different to Bernstein's notion of "Code", used to show how the apparent similarities mask more deeply seated differences in the way the concepts are conceived and used, which contrasts with Bourdieu's Habitus, that tends to be anti-structuralist, and wanting to overcome the subjugation and rigidities of "rules and norms", which in turn is at the heart of Bernstein's notion of code (Harker & May, 1993).

Cultural capital stemming from the work of Bourdieu and Passeron (1973), "cultural reproduction and social reproduction", it is clear that cultural capital refer to non-financial social assets (e.g. educational, intellectual capacities), which may increase social mobility, outside of, or in the absence of economic means. Bourdieu expanded the meaning of capital in *The Forms of Capital* (1986); and in *The State Nobility* (1996), directed at higher education, he notes that capital acts as a social relationship within a system of exchange, extending the essence of his idea to include *all goods, material, and symbolism*, that present themselves as rare and worthy, and being sought after (status) in a particular social system (Harker, 1990). In *The Forms of Capital* (1986), Bourdieu distinguishes between types of capital worth repeating: ***Economic Capital*** – command and control over economic resources (capital, cash, assets); ***Social Capital*** - access to resource bases comprising personalities, groups of people, having relationships of influence and support; **Cultural**

capital - covers knowledge, skills, and education possessed by agents, that provide them social status. Bourdieu later adds ***Symbolic Capital*** – resources like honor, prestige or recognition being used to increase an agent's social status. Cultural capital has received widespread attention from theorists and researchers alike, usually used in context of educational systems, with others being used across categories, like those who uses it for research and supporting argumentation; Others build upon and expand his theory; Others attempt to disprove or discount his views. Only a small number however apply his theory to other inequalities in social systems, which is what this work argues, meaning, that the various forms of capital invariably affects escape trajectories of agents within social systems, most notably in terms of the various inequalities that exist. Work by Emirbayer & Williams (2005) use notions of fields and capital to examine the power relations in the field of social services, supporting this body of work, in that it can be a valuable theory in analysing inequality in any social setting. Stanton-Salazar & Dornbusch (1995) examine how people with the desired types of cultural and linguistic capital in a school, uses it as social capital with institutional agents who can transmit valuable resources to the person, furthering their success in the school, thus a similar expansion to the view of this work (e.g. access to politicians in SA). Dumais (2002) show how gender and social class interact to produce different benefits from cultural capital. A variation of Capital proposed by Emmison & Frow's (1998), explores how Information Technology can be used as cultural capital (bourgeoisie information communication technologies (ICT) can be seen as

an additional form of cultural capital and thus status to its owners). Interestingly for this context, Bourdieu's theory of cultural capital was used to explore multiculturalism and racism in Australia, whereby the notion of "whiteness" (Dolby, 2000) was investigated as a form of cultural capital. He notes that "White" is not about race, but a "shifting set of social practices" (Dolby, 2000). The use of Bourdieu's notion of capital and fields are illuminating to understand how people of non-Anglo ethnicities may try and exchange the cultural capital of their ethnic background with that of "whiteness" to gain a higher position in the hierarchy, which reflects strongly to the SA context as well (e.g. Affirmative Action and Black economic empowerment, which seem to always contain local "white mentors, consultants, and business partners").

These aspects appear to be validated, based upon the local projects undertaken, where the real Apartheid damage was not the violent physical abuses, but the mental enslavement (symbolic violence) accompanying the legacy class system, impacting the Habitus, field and capital of the population. This serves as the backdrop that constitute an important aspect of the rich-picture. Systems, rules, laws, structures and categories of meaning and perception functions effectively as Habitus if they are not thought of as being specific socio-cultural contexts (Bourdieu, 1990). The anthropologist Arjun Appadurai has raised the question, as to the effect that the forces and processes of globalisation have on the Habitus, suggesting the largely unregulated flow of cultural texts, accompanying the

continuous movement of peoples of the contemporary world order, works to “move the glacial forces of the Habitus into the quickened beat of improvisations for large groups of people” (Appadurai, 1997).

As such, the SA legacy of social engineering must equally be incorporated into the local notion of Habitus (Apartheid’s legacy impact upon mind, psychology and body). The “field of power” and the reproduction of symbolic domination, where the “realistic or fatalistic” dispositions of the dominated class, to put up with objective conditions that would be judged intolerable by agents otherwise disposed, actually help to reproduce the conditions of oppression (Bourdieu, 2000). From an epistemological viewpoint, he cites the need to observe vigilance, asking researchers to reflect on their own social contexts, prejudices, and thought patterns that inform their worldview. Additionally, his view on doubt (hyperbolic doubt) recognises this challenge, suggesting a consistent disposition to question the received wisdom, values and logic that a field presents as its common sense, along with the claims the fields make on behalf of itself, i.e. “we can never doubt too much”. He suggests the development of a “doxic” attitude, to guard against values and discourses a field articulates as its fundamental principles and our unconscious submission to what is deemed arbitrary and contingent.

Much of the author own challenges are reflected in the passages above, importantly however are the views on Habitus and practice, as these seem

material to the South African challenge, whereby the mental enslavement (symbolic violence) accompanying the legacy class system, impacted the Habitus, field and capital of the entire population. A variety of strategies seem to emerge from Bourdieu's analysis of the relation between people, social rules and conventions (Schirato & Yell, 2000). Firstly, the need to be self-reflexive of the person's own position and resources within the field(s) or institution(s) in which they are operating. Secondly, being aware of the rules, regulations, values and cultural capital characterising the field of activity. Thirdly, the capacity to manoeuvre, e.g., by turning a particular rule to one's advantage (despite a deficit of cultural capital). An important aspect in the sociological toolkit is the ability to objectify one's own position (to de-familiarise one's view of the world, and guard against seeing and hearing, what one expects – i.e. ensuring objectivity). To describe the context as it appears, researchers have to deal with things that are complex, confused, impure and uncertain, all of which counters the clinical idea of intellectual rigour (Bourdieu, 1991). Because of the inevitable flaws in research, and especially the risk of bias, the need for reflexive sociology seems to be an art that must be practiced constantly.

The essence of Habitus as explicated above, is therefore directly linked to how local, SA agents and agencies perceive and perform core functions such as: Their ***Strategic orientation***, meaning how SA agents and agencies execute various forms of planning; The average agent and agency view regarding their ***Tactical arsenel***, meaning the way they view

and deploy core organisational enablers of ***Technology, People, Processes***; and ultimately, how the agents and agencies work, deliver, or fulfil daily routine activities, i.e. their **Operational activities**. The agents subconsciouly execute these higher order functions, in context of their Habitus, which due to the legacy constraints exclude innovative or new approaches by: having a strong mechanistic disposition toward planning for interventions; focus or arrange their organisational enablers with a strong or sole reliance upon only one of the core enablers, exacerbating the lack of integration; and ultimately, how they execute their plans through their views of tactical configurations, and how they physically execute and deliver daily tasks, all of which conspire in a systemic manner to yield distressed outcomes of vital socio-economic mandates.

1.2 Context and systemic nature of the problem

Looking at the lack of delivery from a systemic perspective, it becomes much clearer as to why SA managers are unable to improve the rate of delivery, as their Habitus informs their overall disposition regarding: how they think about problems; plan for solutions; and implement solutions. The multiple reform activities, and policy initiatives providing additional stress to local managers rapid and tangible socio-economic improvements. The lack of local resource capacity (requisite variety of agents), in context of the political promises made, increase pressure to deliver on core electoral promises of basic infrastructure elements like homes, water, and electricity. This view suggest elements of integration and interrelatedness are not

appreciated, implying that Variety, Habitus, and the Systemic nature of the challenges, are not recognised as key elements to be incorporated into the planning and execution of programmes. Many socio-economic commentators agree that sustainable growth in Sub-Sahara Africa does not have ironclad barriers, and may have a poorly educated labour force but the activity of African traders, or the success of African immigrants in advanced economies, demonstrate the labour skills that are waiting to be called upon, given a conducive environment. In Africa, schooling is low; capital flight is high; war plagues the region, with the Economist (1998) reporting "nearly a third of the 42 Sub-Saharan countries, are embroiled in international or civil wars." If African countries can establish a stable political environment that enable people to gain the rewards of investment in physical or human capital, the alleged barriers to growth will prove surmountable. Local Economic Development (LED) is a discipline still coming into its own, with competing strands of argumentation still generating conflict, the root debate being whether traditional types of local strategies applied in Southern and Eastern Africa, are working and generating "pro-poor" economic development, referring to the systematic capital accumulation at one pole, and underdevelopment at another. Although it was once associated with "dependency theory," it is a far more subtle conceptual approach to understanding ingrained poverty and inequality (Bond 1998, Bond 1999 and Bond 2000).

Specifically in South Africa, the 1994 election promises have largely not been attained, not due to a lack of trying, but rather severely under-estimating the magnitude of the task in relation to the political promises made. Even assuming sufficient resources to meet the ambitious developmental targets, it would still present a huge challenge since the institutional delivery capacity is lacking, i.e. the lack of Requisite Variety, covering the absence of local procedural, structural and substantial variety (Gazendam, 1993), implying the lack of well designed processes, procedures and the experience needed for efficiency, in both public and private sector. The institutional gridlock is a major concern and viewing the challenge in a mechanistic fashion, have exacerbated the delivery challenges over the last decade. South African managers, seem to have a preoccupation with short-term planning or being short-term focused, as opposed to being long-term focused (Thomas and Bendixon, 2000). The average local response to dynamic challenges remain simplistic, since they are seen through traditional mechanistic viewpoints, having fragmented and inflexible planning techniques. Furthermore, the obsession of looking at case studies of other countries alludes to the seeking of some form of "perfect solution". The fact that each solution is unique and should not be looked upon to be "replicated" (Gharajedaghi, 1999), suggests poor planning dimensions. The importance of systemic planning is supported by the work of Ackoff, regarding Interactive planning, leadership and problem structuring (Ackoff, 2001). From a global management and organisational viewpoint, this reactive type of planning and design is one of the key

hidden costs of the collective SA Habitus. It must be noted that the challenge cuts across racial divides, i.e. whilst the black South Africans have been marginalised across education and experience, the white South African's have similarly been protected and given a false sense of superiority.

This is an important implication from a practical viewpoint since the expectation is that white South Africans should theoretically have better skills in management, entrepreneurship, and leadership.

From the project experience viewpoint, this expectation is not entirely accurate, particularly since management reaction to the problems being faced lies embedded in their historical reference data, which in itself was based upon an inward, protectionist heritage. Chris Argyris's (1992), notion of "Skilled incompetence" supports this observation, in that it describes the difficulty to reflect when imprisoned by dogmatic beliefs of one's own truths, to the exclusion of other truths. Further to this, research suggest management education in South Africa, does not contain sufficient transformational and change capacity elements (Randall, 1993). This claim was supported in the findings of local research focusing upon MBA graduate deficiencies such as: being impractical; lacking interpersonal skills; low communication skills; insufficient global thinking; do not work well in groups, among others (Boyatzis, Cowen and Kolb, 1995).

The issue of problem solving abilities is another reason for the lack of delivery in SA, since problem solving proficiency lead to sound managerial decisions and success, failure to instil such skills can lead to poor product and service mix, turf battles and destroys the personal and organisational ability to compete (Bagayoko, Kelly and Hassan, 2000). Higher order thinking allows individuals to consider multiple interpretations, accommodate uncertainty and find order in chaos (Kirkwood, 2000), attained through both convergent approaches, i.e. team qualities; and divergent cognitive approaches, i.e. individual ability (Thompson, 2003). Critical thinking allows managers to act fairly and democratically, to take initiative and to be aware of bias (Brookfield, 1987). Organising and managing oneself is another key trait for managers, essentially implying efficient time management, quality issues, and goal-setting (Mintzberg, 2004), as well as project management, personal workflow processes, covering even e-mails, and telephone calls (Robbins, 2001). At a deeper level still it requires personal mastery (Senge, 1990), and the importance of an enquiring mind in seeking efficiencies. Organising and managing oneself require self-application of basic management principles, organizing, leading, and managing outputs (Robbins, 2001). Self-management is thus about integrity, leadership, accountability and trust (King, 2002), elements that have been highlighted in the rich-picture context of SA's societal and individual Habitus (diagram 1.1) depicting the local service delivery challenges in a systemic context.

Another global trend relates to the capacity for Knowledge Management and Information Technology, having a profound impact on social systems as they have become key drivers of business strategy (King, 2002), and will increasingly become a core competence for managers in the knowledge economy (Nordstrom & Ridderstale, 2002). This point has a direct linkage to e-learning (via web, email, etc), and the critical capacity to evaluate communications, which in turn will impact business decisions and strategies (Kirkwood, 2000). Managing information in this manner inherently assumes capability in terms of reading critically and evaluatively (Davies, 1996). Communicating effectively using visual, mathematical and language skills is thus vital, whilst in SA, we have eleven official languages, however, from a business viewpoint, the preferred language is English (Bruton-Simmonds, 1992), reflecting it's entrenchment in the emerging global economy. However communication is not only about carefully used words and a solid vocabulary (Bruton-Simmonds, 1992), but include the non-verbal, for example, tone, body language, emphasis (Pease, 1993). Consequently, misuse of these may lead to the wrong message being heard or being sent (Morris, 1982). This specific challenge featured strongly in the practice of this research, which translates into seemingly simple issues such as cancellation of meetings at the last minute by key officials forming part of interventions; or having to repeat agenda items over multiple steering committee meetings, before decisions are made. Just these common practices alone serve to derail the best planning and attainment of milestones due to it's consequential effects.

Recent years witnessed extraordinary pressure on local authorities and municipalities, to become more efficient, hinting toward alternative strategies relying upon innovative and integrated development planning concepts. This can be seen as a growing recognition of the importance of integrated planning to link to physical and socio-economic interests, particularly true in developing countries given rapid rural-urban migration, sharpening the focus on Local Government and municipalities. The challenges local municipalities face are well documented, touching upon segregation, institutional weakness, service backlogs and lack of finance. For these to be overcome, according to the *Local Government White Paper* (RSA, 1998a), the "Developmental Local Government", was identified in order to work together with local communities to find sustainable ways of improvement, the logic being embedded in the following institutional realities:

A history of discrimination - Municipalities played a critical role in enforcing segregation and dispossessing and impoverishing the black masses (forced removals, land expropriation, restrictions on trade and employment practices), resulting in few or no assets, located on poor land far from economic hubs (Parnell, 1998).

Worsening poverty and inequality - South Africa's is the world's second most unequal nation, with half the population living in poverty on just 11% of national income, leading to stunting in a quarter of children (May, 1998). Between 1990-4 the infant mortality rate amongst Africans rose from 48 to

54 per thousand, whilst for whites, fell from 7.4 to 7.3, with the national poverty hearings, reaffirming that life is getting harder for many of the rural poor.

Geographic segregation - South African settlements are deeply divided, often with a physical buffer zone between racial and economic groupings.

Rising unemployment - SA's unemployment rate of 34% (RSA, 1999b) is one of the highest in the world, whilst employment in mining and manufacturing has declined for over a decade, with overall private sector employment shrinking at around 2.5% per annum (NIEP, 1999), pushing up urban joblessness, generating a knock-on effect in the former homelands, where rural unemployment is around 50%.

Service backlogs - A fifth of urban households in South Africa have no electricity, a quarter have no running water, a third make do without a flush toilet, and over half have no telephone (RSA, 1997a). Four fifths of rural households have none of these services. The capital cost of providing an "acceptable" service to everyone (defined by national government) is 5.3% of the national budget, after interest payments for ten years, which is twice the amount allocated by government (RSA, 1998b).

Persistent non-payment - Despite a campaign stressing the link between rights and responsibilities (entitled Masakhane or Let's Build Together) and a swathe of service disconnections and court cases, millions of residents still refuse to pay. The national rate of default was 23% in 1997, rising above 90% in some townships (Mathiane, 1997). The total amount owed increased from 26% to 33% of rates and service charges between 1997-8

(Kapp, 1998), suggesting that many households can't afford basic services.

Financial crisis - Over half of municipalities are thought to be in financial difficulty. In 77 councils, one fifth of those who responded to an official survey indicate insufficient cash in reserve to meet a single month's wage bill (Kapp, 1998). National subsidies for municipal infrastructure have been cut and central government has declared its unwillingness to bail out bankrupt authorities.

Pressure from business - The white paper promotes competitiveness and a warning to municipalities not to "unduly burden local business through higher tariffs" (RSA, 1998a). A concern was voiced in this regard: "The white paper's declaration that "provision of basic household infrastructure is the central contribution made by local government to social and economic development" is worrying, since it neglects economic development and may commit local government to unsustainable needs-driven approach" (Bernstein, 1998).

Restructuring - Hastily drawn municipal borders and ward boundaries produced a fragmented system, and impractical sub-structures. Decentralised improvements saw 843 councils, cut to under 300, in seeking to to improve delivery and efficiency.

A key shortcoming in service delivery is therefore embedded in the inability to see the integrated nature of value chains, i.e., strong relationships of accountability between and within agents and agencies across value chains. This is referred to the "long route of accountability," as opposed to the "short route" which is the direct accountability of providers to clients (Figure 1.2). Weaknesses in service-delivery outcomes can be attributed to a breakdown in one or more of the links along the long-route-of-accountability (Keefer and Khemani 2005).

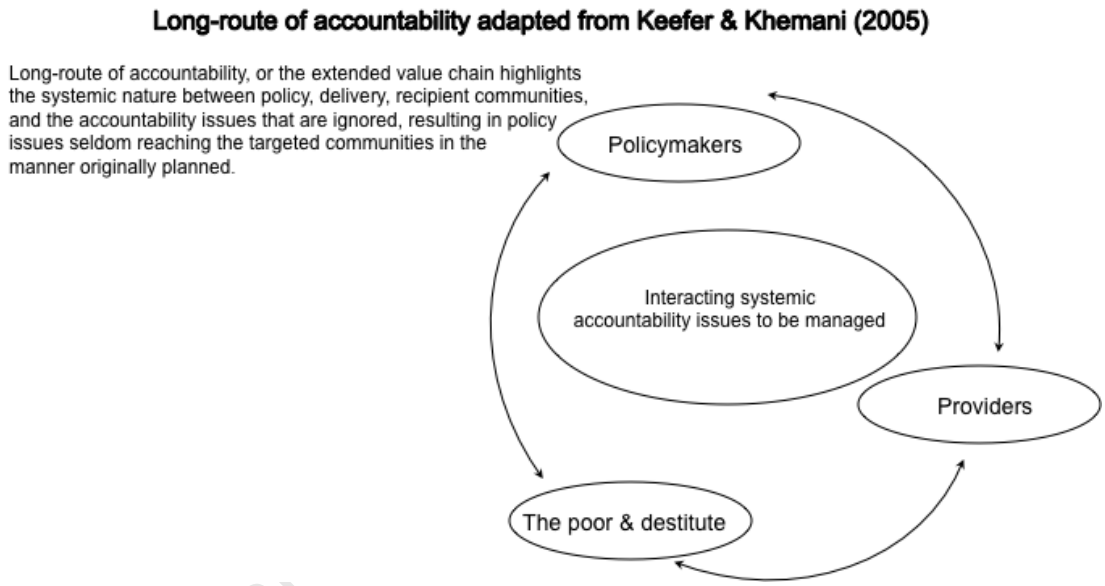


Figure 1.2: The framework of accountability relationships adapted from Keefer & Khemani (2005).

Figure 1.2 explain the relationship between policy ideals geared toward the poor, yet having less-than-desired outcomes, partly due to scant attention given to the systemic interfaces (e.g. the various agents and agencies), and specifically the misplaced assumptions across the long-line-of-accountability. This references the extended value chain that runs from

sound policy ideals, aimed at say, alleviating poverty, through the vast public-private sector systems, to ultimately reach the targeted communities and recipients. The result often being divergent relates to the mis-direction, capacity issues, and poor governance throughout the extended-value-chain dynamic. This view support the finding of certain action research projects, more specifically regarding the backlog of housing in SA and the attempt to address this innovatively (see chapter 5, N2 gateway project).

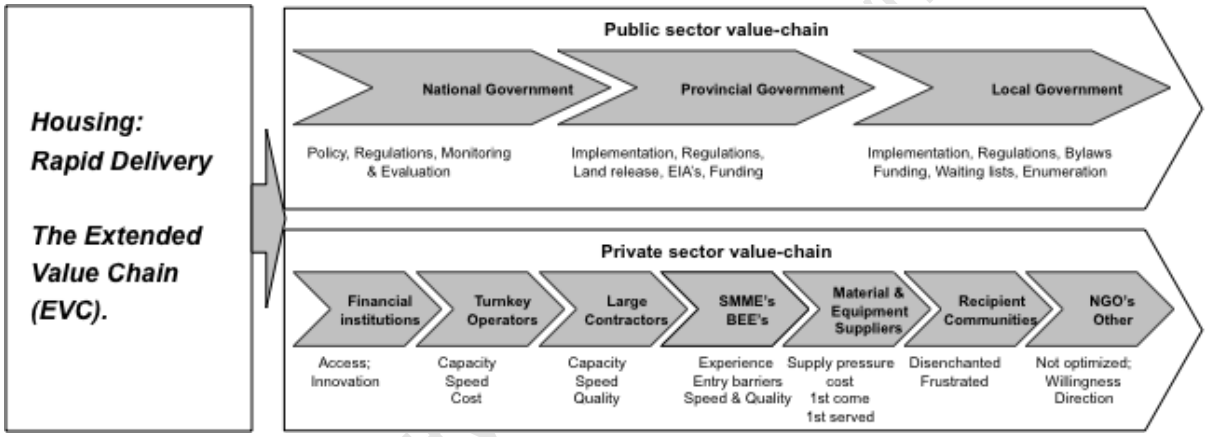


Figure 1.3: The extended value-chain for N2 gateway project

Figure 1.3, is a linear perspective of the long-line-of-accountability, and lays bare the numerous assumptions policy-makers and planners make on behalf of agent and agency behaviour across the extended value chain (EVC). The example is taken from the interventions, expanded upon in chapter 5. It has been included here to support the above point regarding lack of integration and accountability issues throughout the extended value chain, specifically whereby public sector managers have a tendency to focus only upon a few elements or agencies and agents of the extended

value chain (EVC), like turn-key vendors or contractors, often neglecting other vital contributions, which systemically result in failure and non-delivery. The systemic understanding of the EVC is thus essential in order to derive viable “rapid delivery” programmes for government. Key to note is that each segment of the EVC, contain unique and specific challenges that contribute to overall institutional blockages (e.g. lack of innovation hampering Provincial and Local structures to introduce improvements in: environmental impact assessments (EIA’s) for housing programmes; reliance upon large contractors to provide both rapid delivery and empowerment of local skills).

Latest development debates emphasise the importance of improving basic infrastructure and services in developing countries. Until recently the analysis of such service delivery have focused almost entirely on the financing of services, while provision, particularly relating to institutions, incentives, and service provider behaviour, have received much less attention. The Public Expenditure Tracking Survey (PETS) and the Quantitative Service Delivery Survey (QSDS) are new promising microeconomic tools to address this deficit, being useful instruments both for diagnosis of problems and for research as evidenced from the lessons from the PETS that are currently in the field in Africa and Latin America (Reinikk and Svensson, 2002). When looking at the systemic nature of the extended value chain, and based upon practical experience suggests an equal focus on only parts of the value chain, at the expense of other

equally important elements. The inceasing systemic nature, wicked-type problem, or messy problem of service delivery when considering the above factors are self evident, yet critically not realised to be such. Incorporating Habitus of agents and agencies in terms of understanding problems, proposing solutions, and implementing solutions, implies weak conceptual understanding; non-appreciation of interconnectedness of various social programmes; over-estimated institutional resource capacity across the EVC; Optimisitic service provider behavioural assumptions; General lack of requisite variety of both agent and agencies, collectively creating a daunting picture.

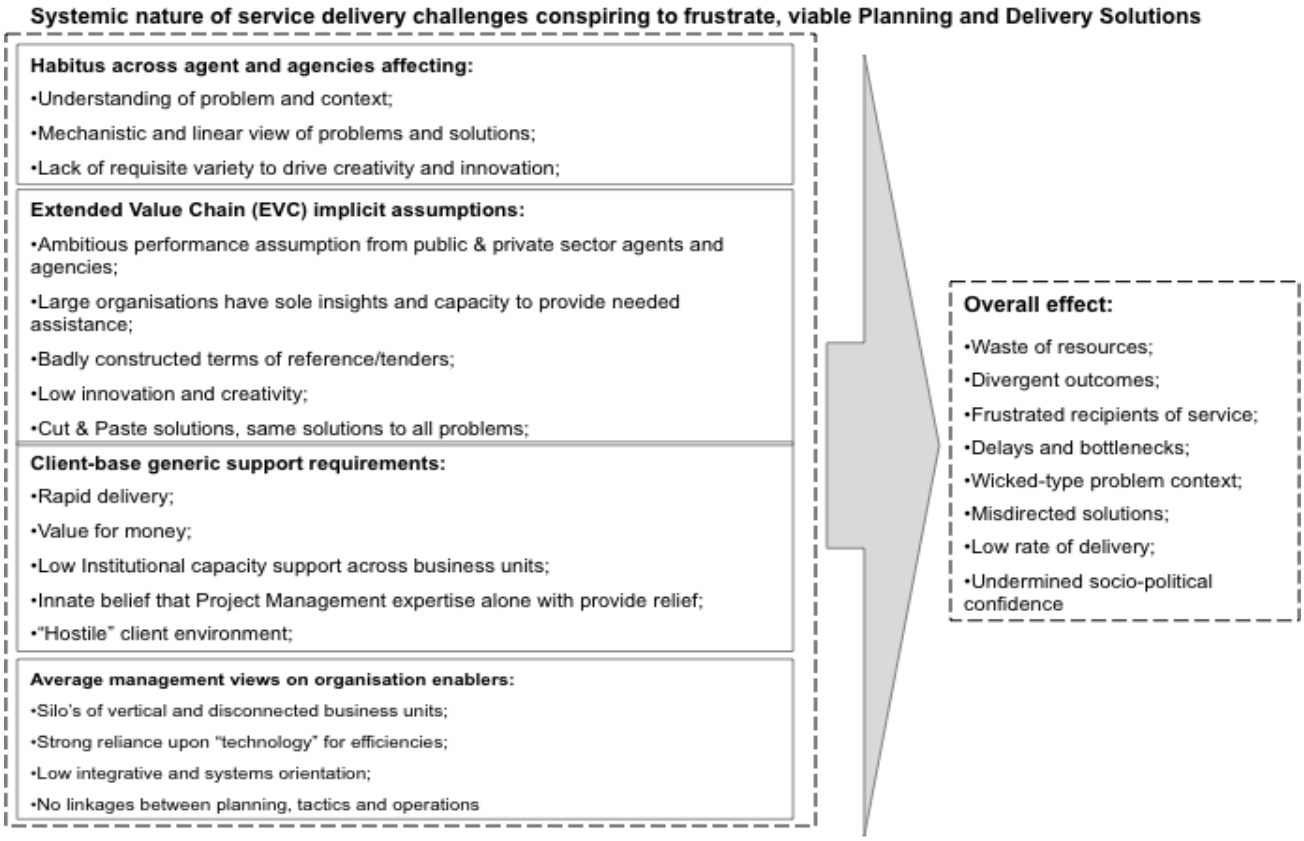


Figure 1.4: Systemic view of core elements frustrating service delivery

1.3 A general view regarding delivery management

Delivery Management is a broad scale of traditional management and project management elements incorporating aspects such as organisation, administration, quality, and supervision of the people, processes, and technologies, which when combined into a comprehensive plan, provides the business and technical functions a platform for successful attainment of objectives. Herein however lies the challenge since there are many old and new management theories ranging from motivation to quality and production systems, which in itself can become confusing to managers in terms of what to use and adopt. Other management flaws include; the refusal to admit that there is no single route to success; a pervasive mechanical orientation; dislike of flexible approaches; and the inability to combine old and new management theories; all of which collude to ensure managers remain on a search for a “silver bullet”.

Despite the substantial change in how scientists view the world today, our managers still cling to the old, outdated mechanistic models (Freedman, 1992). Scientific management pioneered by Fredrick Winslow Taylor (Principles of Scientific Management, 1914), became a classic in management theory influenced by the prevailing Newtonian physics, seeding the still dominant mechanistic paradigm, where we treat subjects as machines rather than people. Other influences include Henry Fayol (Administration Industrielle et Generale, 1916), known to have promoted distinct functions as a vital aspect of management, covering Technical

(production, manufacture), Commercial (buying, selling, exchanging), Financial (utility of capital), Security (protection of property and staff), and Management (planning, control), functions and areas that remain in practice today. Work by Rensis Likert from the 1960's promoted an initial four systems of management - System 1: exploitative authoritative - working downward via fear and threats, with decisions made at the top; System 2: benevolent authoritative – which leaned toward delegation and upward communication; System 3: consultative - having greater involvement of the lower and supervisory levels; System 4: participative group management. Importantly Likert saw management as a continuous process. Douglas McGregor's theory X and Y, seemed to have used notions from Taylor and Fayol regarding human behaviour, which assume workers required to be told and controlled. Theory X - is where people are seen to have an inherent dislike of work and are to be coerced, directed, threatened and punished in order to meet organisational objectives. It suggests people wish to avoid responsibility and prefers security above ambition. In sharp contrast, Theory Y suggests that humans see work as a natural function, meaning that people can be motivated, use initiative, and strive for self-actualisation as their higher form of expression and existence. Theory Y seems more appealing when looking at today's workplace. Later, Theory Z operations (Handy, 1995) came to the fore, which strives to create long-term employment, coupled to slow, steady ascension and teamwork.

Other delivery and production management models include the 5S methodology, using five Japanese words - seiri, seiton, seiso, seiketsu and shitsuke; which describes how items are stored, ordered, and maintained. It is claimed to instill ownership of the process in each employee.

Another Asian influence is that of Mottainai, derived from a compound Japanese term that roughly implies regret of waste. Wangari Maathai uses the expression for her Kenyan environmental protection concept of "reduce; re-use; recycle". The six-sigma model, by Bill Smith of Motorola in the early 1980's seeks to improve the quality of process outputs by identifying and removing the causes of defects via reductions in variability in business and production processes, and relies upon statistical and quality methodologies. It ranks staff in the organisation such as for example Black Belts, or Green Belts, based upon their level of expertise in the method. Originally associated with production processes, where process maturity is described via a sigma defect-free rating, such as for example a six-sigma process enjoys a 99.99966% defect free yield, whereas a one-sigma yields a 31% defect free output. It is inspired by many decades of quality improvement methodologies such as Total Quality Management and Zero Defects from pioneers such as Deming, Juran, Ishikawa and others.

The Theory of Constraints originated by Eliyahu Goldratt in his book "The Goal" (Goldratt and Cox, 1984), adopt a set of processes using a systems approach that focus upon manipulation of a few physical and logical

leverage points, to extract performance improvements. It suggests that only a few constraints within a business, control the results of the entire organisation. The theory adopts three underlying assumptions; Convergence - Inherent simplicity, meaning, the more complex a system is to describe, the simpler it is to manage; Consistency - There are no conflicts in nature - if two interpretations of a natural phenomenon are in conflict, one or both must be wrong; Respect - People are not stupid, even when people do things that are misdirected, there is a reason for that behavior. Learning-by-doing is a concept from economic theory looking at capability of workers to improve their productivity by repetitive action, with efficiency being attained via self-perfection and minor innovations, and was initially used by Kenneth Arrow in his endogenous growth theory, regarding the effects of innovation and technology. Robert Lucas (1988) expanded the concept to explain increasing returns to embody human capital, whilst Yang and Borland (1991) have shown learning-by-doing plays a role in the evolution of country specific ability to have greater specialisation in production.

The few delivery and management models above serve to underpin the vast collection of approaches that exist in various mixes and formats in organisations, which returns to the opening remark of the search for some form of silver bullet, or one fits all solution, underscoring the lack of adaptation and the reluctance to test new integrative approaches to management and delivery. Thus, the growing disillusionment with rapid delivery and tangible economic improvements in the “second” economy still

represents a challenge that government cannot seem to address effectively (Mafela, 2006). The various commentaries and recent studies suggests SA have made tangible progress, across a number of areas, but are insufficient to produce the sought after growth to match both the political promises, and the expectations of the people. From 2001 a more expansionary fiscal stance has been adopted and real growth in non-interest expenditure grew by about 8% per annum on average over the next three years (Treasury, 2004).

Public debt levels have also been substantially reduced from levels close to 50% of GDP to below 40%. The government reduced capital expenditure to allow for increased share of social spending within the budget - period 1993 and 1997, overall per capita social spending increased by about 24% in real terms, with substantial redistribution across income and racial categories (Van der Berg, 2001). There has also been an improvement in revenue collection, supporting the success of fiscal policy, with improvements being reflected in the backlog of un-assessed returns - in March 1998, the backlog was 49%, and in March 2003, this was only 5.5% (SARS - 1998; 2003). The increase in taxpayers, during years 1998/99 to 2002/3, grew an average of 12% per annum, supporting the overall macro-economic platform to be sound and consistent. However, these gains are overshadowed by the lack of delivery, linking the research question to the challenges of delivery and implementation, which is where the prototype intends to provide some form of integrated assistance. It is pointless to improve revenue collection, when the very reserves collected

are misapplied, misused, and when eventually applied to resolving national problems, are misdirected into linear, mechanical solutions that are unsustainable.

1.4 Relevance of the research to the problem

As part of the National healing, the Truth and Reconciliation Commission (TRC) have laid bare the physical Apartheid horrors. However, little is said about Apartheid's social cost, i.e., the symbolic violence, which is the deep psychological injustice that had been perpetrated. Bourdieu's (1991, 1975) research and findings seem very appropriate in this sense, particularly the notion of Habitus and cultural capital, which describes the deep consequences of "social engineering", or being conditioned to fail and accept cultural norms that subconsciously undermine socio-economic progress. This may be important for South Africa's previously disadvantaged, in developing an escape trajectory from the purposeful diminishing of their overall "capital", i.e., their cultural capital, economic capital and symbolic capital, which comprise the cultural field of power. These constructs highlight the damage of the segregated development agenda of old, and alludes to its pervasive influence. This point should not be underestimated since the practical experiences reveal a sense of self-imposed limitation or "glass-ceiling", creating inherent limitations across the field of power. In part, this can be borne out from the criticism to affirmative action (AA), where candidates often have the qualification needed, but lacs

"intuition" or "experience" and as such provide fuel to the misdirected critique toward the importance and necessity of the global concept.

As part of the SA's broader reconciliation, equality and social integration programmes, the government enacted three key pieces of legislation: Employment Equity Act 55 of 1998; Promotion of Equality and the Prevention of Unfair Discrimination Act 4 of 2000; and the Preferential Procurement Act 4 of 2000. These instruments among others were to ensure social justice, and reduce inequalities in the workplace (Bendix, 2001). Some of the more common criticisms levelled at Affirmative Action include: That it is reverse discrimination (Thomas, 2002); That AA appointments are less competent and lack necessary skills (Van Jaarsveld, 2000); That it stigmatises beneficiaries (Resendez, 2002); That it penalises young white males (Swim and Miller, 1996). This dynamic highlights the varied viewpoints from both polarities, which have a direct impact upon both managers and management in general, i.e. a society in transition, having divergent viewpoints, yet expected to create a harmonious working environment, in context of great delivery challenges. The systemic context of the South African delivery problems, underlines key aspects not generally included by SA public sector managers in their deliberation of rapid delivery and institutional reform. The lack of integrating activities and adopting a holistic and systemic view tend to result in focusing only on parts of the value chain of delivery, and as such, create diminished problem formulation and consequently, weak solutions in general. The overall planning and management of service delivery by the public sector

must incorporate integrated aspects of the extended value chain, since it reveal greater detail and clarity of roles and responsibilities across agents and agencies, within the long line of accountability. Once this is better understood, can public-private partnerships be effective. Massive delays and many failures to date, speaks directly to the need to have these aspects infused into public sector management. Failure to appreciate these notions will result in a continued battle to stem growing back-logs of all infrastructure and development, creating ever higher costs in delivery, whilst the recipient communities grow tired and disillusioned with the political promises, which are already manifesting in small scale service delivery protests.

Using the various elements noted it is hoped that the research question is adequately framed and positioned in the mind of the reader. Looking at the legacy factors (Habitus of local managers, how they think, act, and behave; Lack of Variety in terms of agent and agency responses to problems), and how these invariably are to be considered and included in potential solutions. The nature of challenges itself is another consideration, i.e. the technical requirements to infuse key institutional change, whilst in parallel having to focus upon rapid delivery is often seen as opposing forces, whilst the scarcity of expert resources, constrain the best intentions and plans. The developmental nature of the economy and the pervasive problems of the 2nd economy present more argument for effective responses to practically deal with these issues (propensity to legislate and use policy

measures, as opposed to implement or “police and enforce” current measures effectively). The “messy and wicked” nature of the problem is given expression through these diverse and multiplicity of factors that co-create sets-of-problems (Ackoff, 1974).

This dynamic illustrate how the co-producers indeed produce and form part of the problematic issue of effective service delivery in SA. The research question therefore seeks to establish what alternatives exist in terms of integrated planning and execution, capable of taking into consideration the systemic elements highlighted. The problem of having no access to practical systems methods and tools, prevent potential benefits in terms of improved strategies, improved planning dimensions, and robust delivery programmes, to produce greater effectiveness and efficiencies for the public sector.

Despite the systems science progress, our organisations and managers still find it very difficult to direct resources and activities in the most optimal manner (Van der Vyfer, 1991; Mafela, 2006; Holmes, 2006). The failure of many organisational interventions, seem to lie in the absence of practitioners recognising that planned interventions often have deep and unintended consequences across organisational structures, which directly affects the organisations viability.

Based upon research, it has become clear that the lack of integrating aspects of planning, implementation and management, across and within departments, represent one of the root causes of project failures and

service delivery constraints. The lack of these elements seem to explain why our organisations struggle; why our best plans are ineffective; and why our planning parameters hardly appear relevant upon it being reviewed. It has been long noted that organisations can in fact be seen as systems (Berger and Luckmann, 1967), whilst our managers are finding it increasingly difficult and perplexing to deal with dynamic system consequences (Casti, 1994; Crutchfield, et al, 1986; Merri, 1995). A great deal of research seem to suggest that something is fundamentally wrong with our social systems, citing both the skewed distribution of wealth and knowledge of understanding (Ackoff, 1999; Toffler, 1971; Drucker, 1994). Ackoff further highlights tools and techniques of how we can improve upon these mechanistic planning parameters to ensure greater viability and sustainability. According to Gajedaghi (1999), there are five principles acting together that define the characteristics and behaviour of organisations or socio-cultural systems, these include: **Openness** - living systems can only be understood in terms of their context; **Purposefulness** - choice, implying rationality, emotion, and culture, is the primary idea behind purpose, thus systems can alter their ends, and can prefer one future over another; **Multi-dimensionality** - the "ability to see complementary relations in opposing tendencies and to create feasible wholes with unfeasible parts"; **Emergent properties** – synonymous with system typology properties, typically, where the whole is not deducible from its parts, usually produced by the interaction, not the sum of the parts; **Counter-intuitiveness** - actions intended to produce a certain outcome,

can produce the opposite, i.e. the classical linear concepts that do not consider delayed effects, circular dependencies, multiple effects of a single event, and resistance to change, all of which impact notions of predictability and uncertainty; None of these elements are truly incorporated in terms of local policy, planning, management and implementation levels as evidenced on projects undertaken, worsened by the low interest in absorbing the transfer of systems-type capacities across interventions. Gajedaghi (1999), suggest that for organisation and management to be adequately "developed" impacts both the collective and individual, to be well developed, require high differentiation and integration, i.e., requisite variety. Differentiation brings flexibility and innovation, while integration assures a feasible whole whose different parts are complementary and effective. Similarly, a well-developed individual has both desire (motivation) and ability (competence), so despite the difficulty of control, by creating a transactional environment, supported by sound leadership, create the capacity to influence what cannot be controlled and appreciating what cannot be influenced (Gajedaghi, 1999; Leddick, 2000).

The context and relevance of the local rich-picture and the interconnected messy challenges, articulates the nature of research question, and underlying elements precipitating frequent service delivery riots in SA.

1.5 Research exploration and development strategy

Robust research exploration is one that generates data and interpretations appropriate to a given context (Dick, 1995). In action-oriented research the ethical challenges and lack of control over variables (Graziano and Raulin, 1993), presents challenges that muddy research methods when compared to traditional research (Susman, 1983; Dick, 1995). Important for this work, are the cyclical, self-reflective aspects contained in broad action-oriented research, commonly used in social settings (Car and Kemmis, 1986) whereby the researcher enriches his/her understanding and practices, as well as the situation that the researcher is in. This sequential enrichment or learning via an interlocked cycle of action and reflection (Winter, 1996), was deemed ideal for this body of work, motivated and detailed in Chapter 4. The output for this section is to setup the cyclical, acting-reflecting process as the continuous loop of improvement, supported by the likes of Dick 1995; Zuber-Skerritt 1990; Oja and Smulyan 1989; Car and Kemmis 1986.

Data collection, rigour, interpretation, and validity also undergoes the cyclic iteration, before proceeding to the next cycle to ensure disconfirmations, improvemnets in reflection techniques (Dick, 1995a), acknowledging: my role as an agent/consultant providing intervention or project support; the data collection and interpretation of experiences by intervention stakeholders; highlight disconfirming evidence and data; ensure flexibility, learning and permit utility of intervention data and the interpretation

thereof, to alter future action for testing. Such a constructivist or interpretivist position allow interpretation of agents and agency's mental constructions of their experiences (Guba & Lincoln, 1989; Graziano & Raulin, 1993; Patton, 1990). The critique of action research, usually hinge upon weak participatory processes (Simonson & Bushaw, 1993; Vakil, 1994), and notions of intra-subjective and inter-subjective engagement with action research (Lomax & Parker 1995). Having noted this, I remain steadfast in my research design and strategy since it surfaces assumptions relating to ontology, epistemology and human nature, whilst providing the capacity for rigour via cyclic iterations, and use of qualitative data to contribute in terms of depth, openness and deeper understanding.

The research methodology and sampling are unpacked in chapter 4, which adheres to the "**C-Q-A**" framework, articulating the overall **Concern/s**, the actual research **Question/s** that stem from the broad concerns; and finally the **Answer** (theoretical prototype), that seeks to provide support and assistance to the problem.

The research design supports the view forward by Maxwell (2005), proposing an integrative model, aiding both researcher and examiners since it highlights how the segments and chapter support each other to create a fluid and clear strategy and design. The diagram below is an adpatation of his perspective, whereby the strategy ties the top and bottom triangles in figure 2.15 below, into a neat connection to the core of the research problem (Maxwell, 2005).

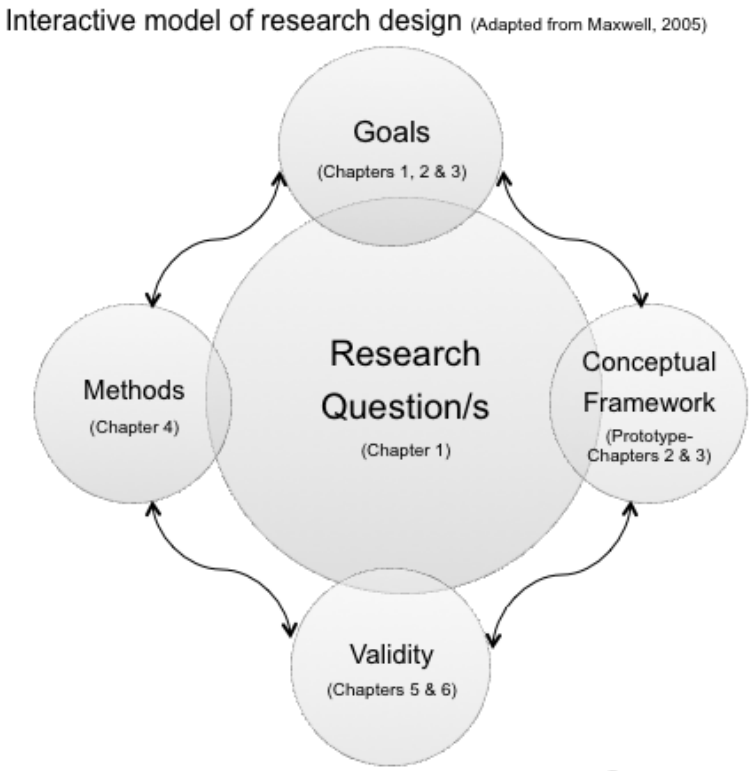


Figure 1.5: Interactive model of research design and strategy, adapted from Maxwell, 2005

Applying this research design and strategy outline the: "***Goals***" – as noted above, and why it is worth doing the study; Which Policies and Practices the research wish to influence (e.g. *rapid delivery; service delivery backlogs; Intervention Planning, Implementation)*; Why the need for the study (*socio-political and economic improvements for SA*); Why others should care about the research (*developmental economies using mechanistic solutions have not closed the Rich-Poor gap*). "***Conceptual framework***" highlights what the researcher believes is going on with the setting (*lack of variety; little innovation and flexibility*), the people (*how they excute their duties as influenced by their Habitus*), and what the research wish to study (*lack of integrated action*); What existing research will be

accessed to help ground the work (*system science body of knowledge*). "***Research Question***" highlights what the researcher specifically wish to understand by this study (*underlying reasons for the lack of service delivery and divergent socio-economic outcomes*); What the researcher does not know about the phenomenon (*hidden or covert underlying reasons for overall poor performance*); What questions the research wish to answer (*provide a practical systems-based design and delivery tool*) . "***Methods***" refer to what the researcher will actually do in conducting this study (*build a theoretical prototype to be aplied in live intervention contexts*); What approach and techniques will be used for data collection, covering relationship with particpants (written descriptions and *documents, interactive interviews, reflexion*); Settings and principle times, places of data and documents, as well as data analysis and techniques (*public and private sector interventions; combination of data collection techniques*). "***Validity***" – covering how might results or conclusions be wrong (*researcher bias and interpretational divergences*); Alternate interpretations and validity (*being doxic and ensuring a reflexive disposition*); How the data selected support or challenge the ideas (*merit of data collection techniques and public documents for validation*); Why should the results be beleivable (*drawing conclusions and providing insights based upon recorded case studies and evidence*). All of these are covered in chapter 4, but for brevity, it was thought prudent to repeat it early in the thesis to prevent the reader having to turn between chapters. Also, each of the segments highlighted by Maxwell has been allotted to the pertinent chapter

numbers for ease of reference. The theoretical prototype integrates a number of practices and tools, creating it's proposed scalable foundation. The protoype version 1, was subsequently applied in live project interventions via three action research cycles, supporting the longitudinal design of the research. At each research cycle, the protoype was reviewed and improved based upon feedback from the interventions, which had 2 application areas, or 2 "Worlds": "***The World of the client***" (interventions or projects); and "***The World of the Designer***" (firm), executed in the cyclical model suggested by Kemmis, (1995). The figure below concretises the journey of cyclical improvements across each of the three action research cycles, providing improvements in both the prototype and intervention outcomes.

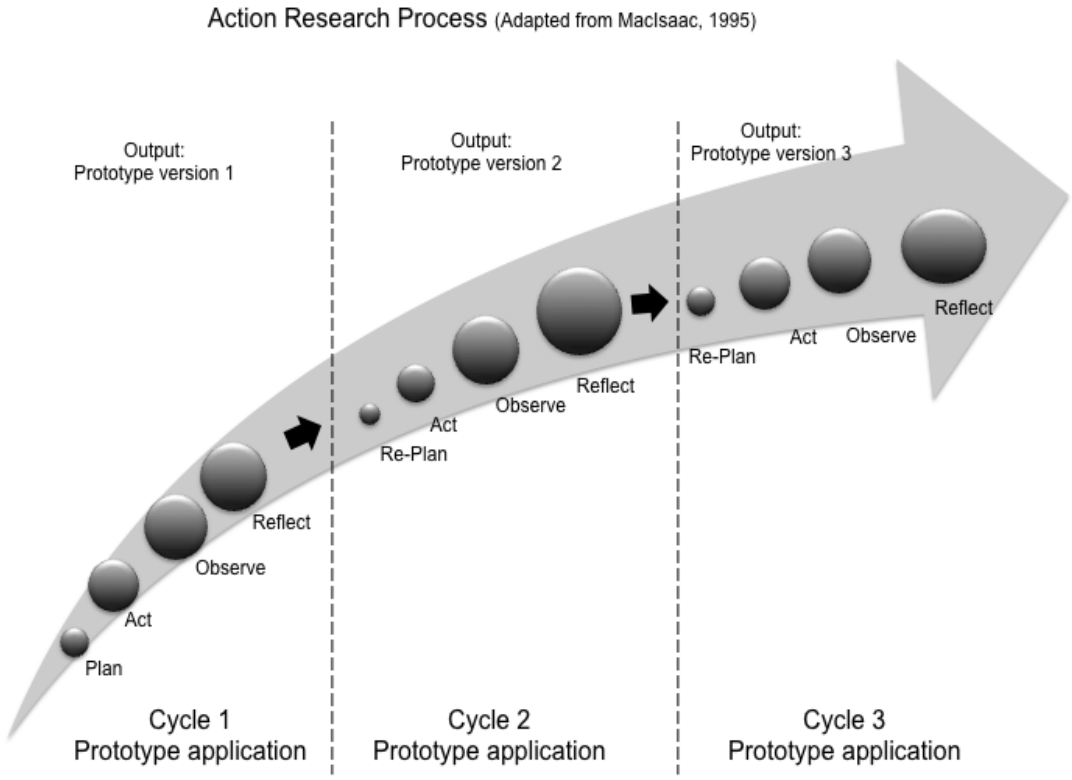


Figure1.6: Action oriented cycle of improvements to the protoype and intervention outcomes

This strategy retains the iterative logic of both Kemmis (1995), and Maxwell (2005), which have been executed within the overall C-Q-A journey, allowing the author to retain his sense of direction and purpose. Detail of the C-Q-A journey; the action-oriented debates, and methods; as well as the data collection techniques are contained in Chapter 4, so as to ensure the developmental journey conforms to the logic of discovery and validation applied in sociology, where discovery is equally scientific as validation, since it is really the basis of speculation, which leads to the construction of a hypothesis, and then a research problem or programme (Bourdieu, 1999).

Bourdieu's concepts of habitus, field and capital, arguably constitute the most significant and successful attempt to make sense of the relationship between objective social structures (institutions, discourses, fields, ideologies) and everyday practices (what people do, and why they do it). With this backdrop, the differences between the application areas (World of the Client, and World of the Designer) differ significantly, whereby the "world of the designer" relates to using the prototype to manage a "firm" or organsatiion specifically created for the purpose of using the prototype concepts in its operations and marketing. Whilst the "world of the client", relate to the interventions or projects that the "firm" executed for its clients.

These 2 “worlds” are highly interrelated and explicated in chapter 4. Figure 1.7 below should provide clarity as to the relationship between the two worlds”, and how they provide for two different “systems-in-focus” generating different insights to various aspects of the prototype.

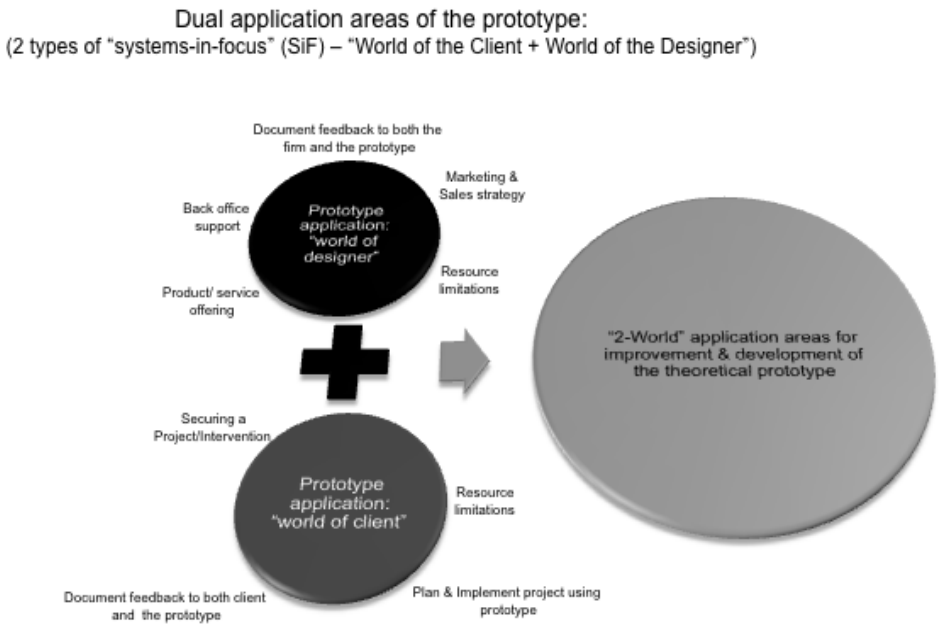


Figure 1.7: Dual application areas, highlighting it’s interconnectedness: the World of the Client; and the World of the Designer

Both “worlds”, the newly created firm, and client interventions, are constrained by various resource limitations, and was important to note differences in responses by each world. Another aspect is the co-dependency between the 2-worlds, refering to the “firm” needing to compete within the same market for its survival, whilst affecting change to it (client outcomes). This makes explicit the muddied nature of live environments, as opposed to the neatly boxed theoretical environments,

touching upon the debate of action-based research and traditional research, though not a focus of this work. It's importance relate to goverance, ethics and the nature of competition by agents and agencies, that are seldom brought to the fore using traditional methods of study.

CHAPTER 2: SOLUTION DEVELOPMENT AND GROUNDING

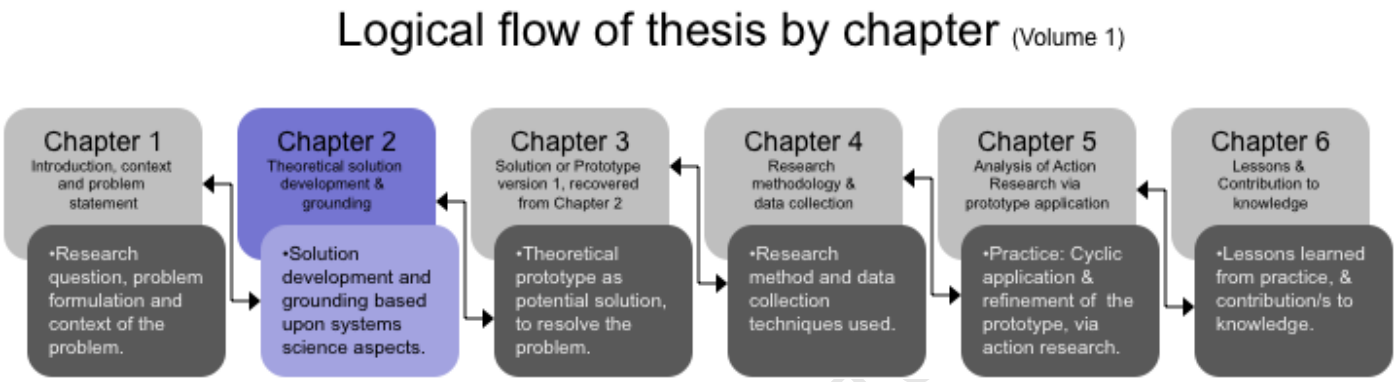


Figure A.2: Repeat of figure A, highlighting chapter specific focus and content

This chapter highlights the broad families of literature that were deemed important to address the problem highlighted in chapter 1. It provides insights as to research and development of Systems and Management theory foundations, it's grounding and philosophical traditions. It proceeds to refine this broad view, into specific theoretical elements identified to be important to resolve the problem, and identify the "gap" or practical need, much like the "specifications" for an ideal theoretical solution to treat the problem identified.

The pertinent "families" of literature, provided the grounding, whilst the specific theoretical aspects recovered from previous research and thinking, was used to develop the "specifications" of the prototype. This approach suited this work, and reflects the practical approach suggested by Perry (1998), whereby parent disciplines are reviewed; key theoretical areas pertinent to the problem are highlighted; identifying any "gaps" that may exist, and how this "gap" may be addressed. The chapter follows a simple structure, in trying to answer the question raised.

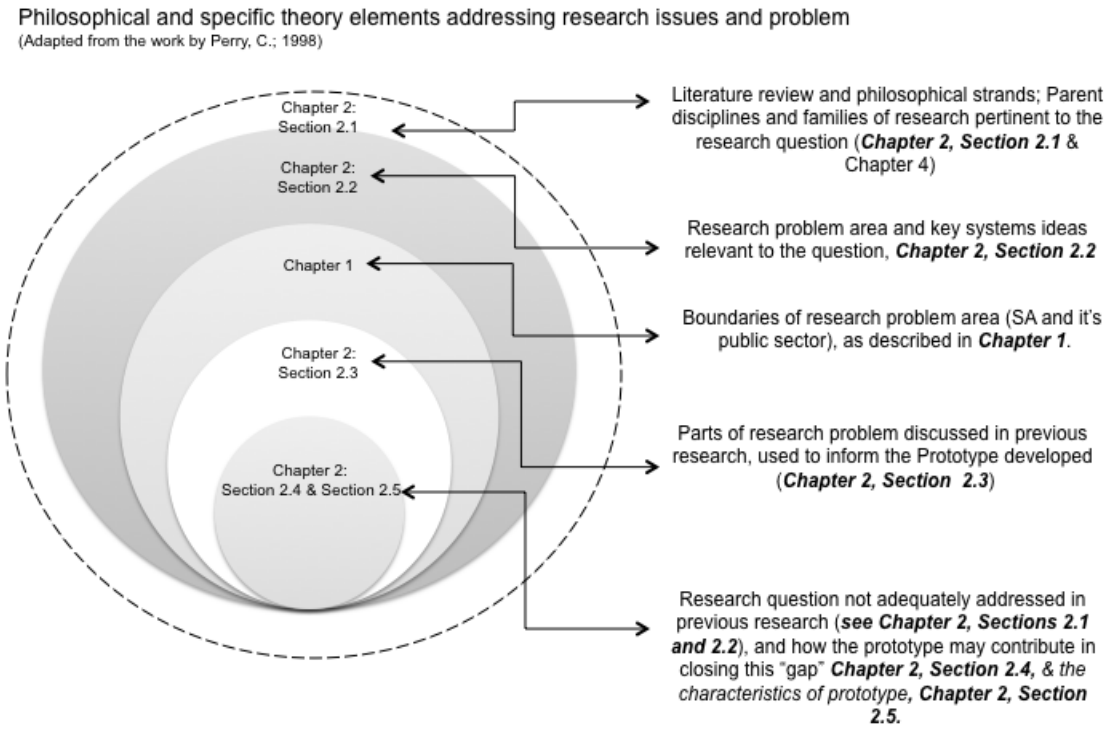


Figure 2.1: Flow of chapter 2, adaptated from Perry, C., 1998

Figure 2.1 sets out how this chapter intend to guide the reader in terms of: The philosophical strands and broad lineage of systems science (section 2.1); Pertinent systems research recovered that were deemed relevant to

the research question (section 2.2); Which systems ideas were used to inform the development of the prototype (section 2.3); Specific systems ideas "absorbed" into the prototype (section 2.4); and Characteristics of the prototype (section 2.5), which tries to articulate the gap between existing tools, and the local need.

2.1 Why systems science

The list of researchers are many and varied, requiring care, understanding and acknowledgement of ideas, thinking and concepts weaved or "absorbed" into the prototype. The family of management systems thinking literature, include authors such as: Jackson & Keys (1994) for their 4 system typologies and their research on system of system methods (SoSM); Mingers & Gill (1997) for their views on pluralism and critical systems thinking; Flood and Jackson (1991) for insights of the TSI process in dealing with messy problems. The family of general research and improvement related literature, covered the likes of Popper (1979), and particularly Bourdieu (1999, 2000) for his insights on Habitus and social system features that tend to subvert national development goals. Furthermore, a number of researchers suggest the need to study systems theory and action research together (Wilby, 1996; Levin, 1994; Checkland 1991), whilst others suggest prudence in terms of accessing action-led research (Reason, 1988; McNiff, 1988), to name but a few. As noted, the multifacted or wicked-problem dynamic, stem from a range of interconnected social, political, and economic challenges (cultural diversity; constrained capacity; service delivery backlogs; multiple reforms; agent

and agency Habitus; and low requisite variety, collectively generate a messy landscape. Based upon the research and practical project experiences, these factors conspire to produce the divergent developmental targets, and the slow pace of service delivery.

Local thinking, planning and implementation are dominated by mechanistic processes, that inherently ignore systemic factors, despite dealing with complex interventions, e.g., the rate of the Public Finance Management Act (PFMA) roll-out, focuses upon policy development on say Assets and Procurement, but ignores the deep lack of financial skills and training that should accompany such bold programmes. Leadership seem ill-aware of the value of systems thinking and thus unable to integrate various constraints into solutions, compromising current solution to socio-economic development. The various projects and programmes under the respective departments, reveal planning techniques that assume all resources, across the extended value chain (EVC) will and can produce the theoretical support within the boundaries of accepted quality assurance. This infers a tacit assumption that indeed, organisational resources have both the ability and capacity to align themselves appropriately in order to create the value expected. The use of systems science aims to improve such planning and delivery techniques, resonating with the notion that systems thinking, can be seen as a reaction to the failure of natural science, when confronted with complex, real-world problems set in social systems (Checkland, 1981).

The SA challenges qualifiy as being “wicked” in nature by it’s varied simultaneous challenges (multiple viewpoints; governance; rapid delivery and and infrastructure backlogs), all of which require various kinds of attention at various levels of organisation to be integrated. These systemic factors induce even the best managers into confusion, compromising their decisions and preciptating delays in service delivery. The nature of wicked problems (Rittel, 1988; Rittel & Weber, 1969; 1973; 1984; Conklin, 2005; and Ackoff, 1974) are really sets of problems that are interrelated and integrated across agencies, which disallow a single intervention to resolve the negative outcomes, but instead requires a carefully systemic understanding and solution grounding, having no singular right/wrong answer.

The broad area of management systems refer to the ever growing body of academic literature using systems ideas (e.g., open systems, closed systems, boundaries, sub-systems, elements and relations, complexity, communication, control, self-regulation, hierarchy, structure, emergence, and evolution), and how these constructs address the problems of management in organisational and societal systems. This literature is usually identified under category labels like “systems approach”, ”systems thinking”, “systems movement”, “systems research”, “systems practice”, “systems theory’”; “systems and cybernetics”. Certain commentators have used the label “systems movement” to refer to the broad intellectual landscape within which this literature has flourished (e.g., Checkland,

1981; Flood and Jackson, 1991a; Klir, 1991). It has been long noted that organisations can in fact be seen as systems and constructs of reality (Berger and Luckmann, 1967), supported by other findings citing that managers are finding it increasingly difficult and perplexing to deal with dynamic system consequences (Casti, 1994; Crutchfield, Farmer, Packard, and Shaw, 1986). Investigating the various methodologies, revealed different interpretations of how and why the systems movement have emerged, linking it to an awareness about the need to study the interconnectedness of phenomena and also of the mechanisms that generate the phenomena (e.g., Flood and Jackson, 1991a; Ackoff, 1981; Churchman, 1979). This supports the local context and research problem in terms of the subconscious Habitus of agents and agencies in adhering to dated rules, behaviour, patterns, norms and standards, which co-create the problem.

This mechanical worldview undermines innovation, creativity and forgoes notions of interrelatedness when charged with functions of planning and delivery. Systems science is linked with the study of complex integrated wholes having “emergent properties” (e.g., Capra, 1976; Checkland, 1981; Beer, 1979), with its rich history resulting in a few attempts at synthesising the work into a more encompassing framework like “system of systems approach”, from Jackson and Keys (1984), and Creative holism (Jackson, 2003), that emphasise integrative aspects, drawing from major systems approaches such as: Hard Systems Thinking; System Dynamics;

Organisational Cybernetics; Complexity Theory; Interactive Planning; Soft Systems Methodology; Critical Systems Heuristics; Total Systems Intervention and Critical Systems Practice. Until the 1970's systems thinkers (theorists and practitioners), appeared to enjoy a similar paradigm, in that systems of all types could be identified by empirical observation of reality and be analysed using the same methods as that of natural sciences, therefore dominated by positivism and functionalism (e.g., system strands like general system theory; management cybernetics; system dynamics; operational research contingency theory; socio-technical systems theory; operational research; systems analysis; and systems engineering). During 1980's the traditional systems thinking came under increasing criticism, from those who felt it unable to deal with "ill-structured" and "strategic problems", resulting in a slowdown in the development of the discipline, eventually causing systems approaches to visit alternate options e.g. Critical systems heuristics (Ulrich, 1983); Organisational cybernetics (Beer, 1972) to improve extreme complexity; RAND (Gass and Harris, 1996) which have a softer approach; and Soft systems thinking (Churchman, 1971; Ackoff, 1974, and Checkland, 1981) for improved capacity to deal with human and social aspects of problems. These system themes have been expanded upon as part of section 2.2 of this chapter.

Critical systems thinking draws much from both traditional systems thinking, and the newer systems approaches from the 1970's and early 1980's, recognising contributions from pioneers of applied systems

thinking. Recent work by Jackson suggest that critical systems thinking and the methodologies associated with it were developed to allow analysis of complex societal problems and improved interventions to resolve such problems (Jackson, 2001). Early approaches employing systems ideas (e.g. operational research, systems analysis and systems engineering), were suitable for well-defined problem statements, but suffered from certain limitations when faced with complex problems involving people having divergent viewpoints (Jackson, 2001). Systems thinkers responded with approaches such as system dynamics and organisational cybernetics to tackle complexity (e.g. soft systems methodology and interactive planning to handle subjectivity; critical systems heuristics to help the disadvantaged in situations involving conflict).

Barry Oshry's work from Powerlabs (http://www.powerandsystems.com), also seem to demonstrate how breakdowns in organisations develop out of our blindness to the human systems (agent or individual), suggesting the adoption of a systems perspective to introduce new levels of understanding of ourselves, to reveal how the problems we often believe to be personal are in fact systemic. Another view on organsiations having system qualities is offered by Gareth Morgan (1986), who describes organisations as being: like a machine (the closed systems view); like an organism (open systems view); like a brain (learning systems view), like a culture (emphasis on norms and values); like a team (unitary political systems) or like a prison (coercive political systems). He explains how an

organsation can simultaneously contain multiple elements (Morgan, 1986), with similar systemic interconnectedness being expressed by Churchman (1982), pointing to the systemic relation between, say inventory levels and other parts of the organisation such as sales, financial, or transport elements.

A key success of systems thinking is the linking of theory and practice (Jackson, 1997a), serving as a model that can be used in information systems and applied disciplines in general. Creative holism (Jackson, 2001), is another model designed to assist managers address complex problem situations, and according to Jackson (2006), such failure arise because the solutions are not truly holistic or creative enough. Creative holism therefore outline the systemic benefits of holism and creativity to equip managers to deal with complex problems. In essence thus, it would appear that systems science are best equiped to provide insights into dealing with wicked problems. Rittel and Kunz (1970) developed a technique called Design Rationale (derived from their Issue-Based Information System, IBIS), which objectively document and facilitate the rationale behind group decision-making. A recurring theme in research ties wicked problems to design problems and vice versa, since both have ill-defined problems; divergent multiple stakeholder viewpoints; have no optimal solution; and require creativity. In a paper published by Roberts (2000), he identifies strategies to cope with wicked problems: Authoritative – tames a problem by placing solution in the hands of a few people, which may not have all perspectives to solve the problem; Competitive – engages

all stakeholders to locate best possible solution, which may create adversarial relationships; Collaborative – engages all stakeholders in order to obtain consensus, which may take a long time.

Ackoff (1974) also wrote about complex problems, calling them “messy” whereby problems interact with other problems, creating a interrelated system of problems. Levin, et al (2007) introduced super-wicked problems in 2007 when addressing Climate Change in their paper. Super wicked problems have additional challenges of Time running out; no central authority; those seeking to resolve the problem, causes the problem, creating hyperbolic discounting. Design Thinking is another model for practical, creative problem solving based upon a creative process that “builds ideas” with no judgments early in the process, thereby encouraging maximum participation in ideation and prototype development, which include an iterative implementation technique consisting of Inspiration - what is the opportunity/problem; Constraints; Involve many disciplines; Ideation - Brainstorm, Sketches, Frameworks Integrative thinking, Prototype development; and Implementation - Marketing and communications, Buisness case (Brown, 2008). Design thinking is said to be subjective due to the personal taste aspect, design thinkers however share a common set of values covering creativity, teamwork, outside-the-box-thinking, and curiosity (Herbert, 1969). Added to this sense, from a pratical view, most of the systems models and tools are extremely good at the “front-end” or softer aspects such as strategy and planning, however very little exist in terms of the harder, “back-end” implementation methods

and tools. The existing tools and methods to implement systems solutions are mostly inaccessible to laypersons; require great intellectual effort; and does not provide for a seamless extention into implementation. As an example, the current thinking in terms of SSM, TSI and VSM provide exceptional insights for planning and designing solutions, but requires additional support in terms of integrating this type of planning to actual interventions and operations. To bring the important strands relied upon for the theoretical development of the prototype into sharper focus, the following served as a guide: Multi-methods, due to the appreciation of the various system typologies that exists within and between agencies; Soft systems methodology for its utility in terms of factoring in planning and design elements; VSM for it pervasive use and flexibility in terms of structuring and mapping sub-systems that aim to produce viability for social systems. These areas, in context of the research questions, provide useful elements to draw upon, in terms of developing the prototype (see figure 2.2 below).

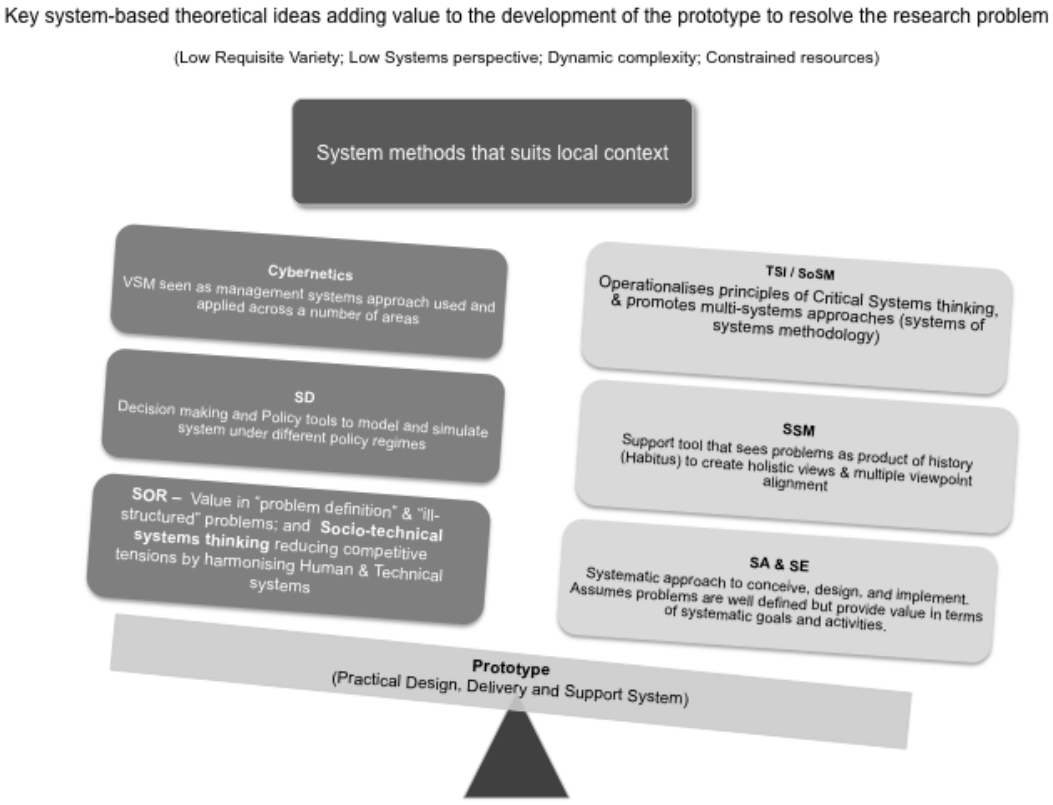


Figure 2.2: Key system-based ideas & models suited to the prototype

2.2 Systems models relevant to my problem

Moving from figure 2.2 above, multi-model system ideas appear to offer better ways of dealing with wicked-type problems and messy contexts by integrating deeper understanding, conceptual insights, and creativity in management action. This serve as motivation to drive the theoretical development of the prototype in order to attain integrative requirements covering: Divergent viewpoints; Socio-technical disharmony; Pre-occupation with thinking and planning as opposed to implementing; and provide better clarity to the perceived wicked and messy problems being faced.

Jackson suggests systems thinking to suit rich pictures of holism, as well as using various methodologies, in a coherent manner to promote successful interventions in complex societal problem situations (Jackson, 2001). Jackson & Keys (1994), highlight four types of systems methodologies – functionalist, interpretive, emancipatory and postmodern, each having their respective models, tools and techniques, which can be used in the service of other methodologies as well (Jackson & Keys, 1984). The mixed-mode modelling seemed a convenient starting point and grounding for the prototype as it may resolve the problem formulated, whilst the nature, complexity and depth of some of the projects undertaken also promote some form of combinatorial approach, e.g. the OAG project where client focus was high on policy issues, with little regard for enabling the policy instruments (process, people and technology); or the RBEB project having prolonged strategic planning, at the expense of operationalising the plans.

These examples support Jackson and Keys (1984) in the sense of establishing coordinated and integrated efforts, designed to deepen the understanding of various problem statement contexts and the types of solution methodologies needed.

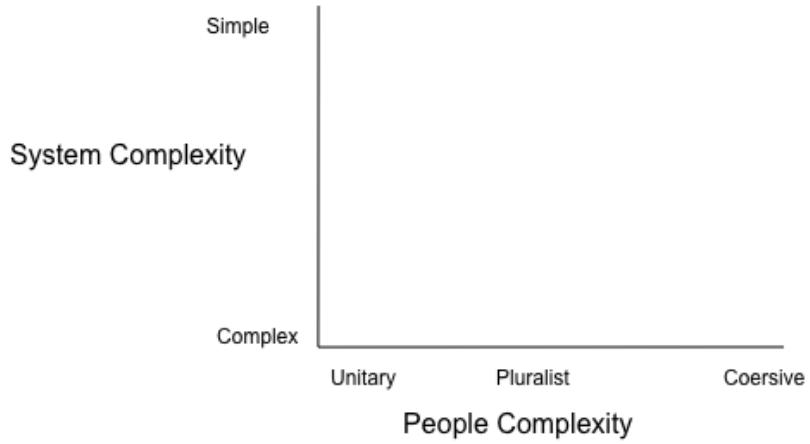


Figure 2.3: The system of systems methodologies (SoSM) based upon Jackson & Keys (1984).

Figure 2.3 suggest the application of methodologies can be understood through determination of the problem contexts to which they are applied, i.e. a sort of problem definition tool, allowing for context classification, through which the problem context can be categorised in terms of "people complexity" (ranging from unitary to coercive); and a "systems complexity" (ranging from simple to complex). As an example a problem could be viewed as being say "simple-pluralist" in terms of the matrix, implying it may be: "simple" as it has few elements and few interactions between elements; and it may be "pluralist" in terms of multiple viewpoints (for a more detailed analysis applying SOSM, see: Clarke and Lehaney, 1999). SOSM forms a basis for determining the methodology to be used in the intervention, for example, a "simple-unitary" problem context, would require the use of a methodology which focuses on design issues, and does not seek to address multiple viewpoints, since it is excluded by virtue of the matrix context classification. Lattitude is granted in the SOSM on how methodologies should be applied, most likely leaving such detail to the

individual methodology applied. This is an important point for the author since the SOSM tend to inform the overall intervention design, and does not impose specific methods in specific conditions. Another multi-method approach is the "pragmatic approach", which suggest methodological mixing across subjective and objective paradigms, based upon commercial work (Mingers and Gill, 1997), requiring the consultant to gain mastery of a variety of methodologies, methods and techniques, and apply them in a contingent fashion to the problems encountered.

In a manner, much of this has been revealed during the prototype application, specifically in terms of systemic skills transfer during project exectuions, underscoring the difficulty for the layperson to apply systems type solutions due the the mastery of various systems models needed.

Jackson (1999; 2000) promote pluralist models, citing "... to make the best use of the methodologies, methods, models and techniques ... to tackle diverse and difficult problem situations while ... ensuring their continual improvement through research" (Jackson, 2000). Pluralism tend to encourage flexibility in the use of methodologies, enabling practitioners to decompose approaches and tailor them in a coherent framework. Jackson (2000) calls for a meta-methodology, suggesting nine "guinelines" to promote a structured way of thinking in order to relate to the rationale adopted. Flood and Jackson (1991), group systems methodologies on assumptions methodologies make about problem contexts. The prototype

development adopted these insights in two ways. Firstly, that interventions always cut across various boundaries, which tend to be ignored by those developing problem statements. This implies the prototype to have qualities to take the intervention terms of reference (i.e. client version of the problem), into a more systemic problem statement, so that boundary issues are highlighted and noted, prior to generating solutions. Secondly, it requires the prototype to offer a sense of integration between the two views (mechanistic versus systems-based problem statements) in a practical manner, so as not to confuse, but enrich participants.

Figure 2.4 below depicts Flood and Jackson's (1991) perspective, but offers little in terms of practical implications, supporting the secondary point made above. It provides a simple means of grouping systems approaches, but has been critisised (Midgley, 2000), since the matrix of methodologies can be interpreted as being "everything at once".

System Type	Participants: Unitary	Participants: Pluralist	Participants: Coersive
Simple	**S-U** SD; OR; SA; SE	**S-P** SSD; SAST	**S-C** SD; OR; SA; SE
Complex	**C-U** VSM; GST; Socio-Tech. Contingency theory	**C-P** SSM; Interactive planning	**C-C**

Figure 2.4: Adaptation of paper by Frandburg, 2003, International journal of Computers, Systems & Signals, Vol4, Number 1: on assumptions made by Flood & Jackson (1991)

Midgley (2000) sees pluralism as being:

(i) theoretically incoherent because different methods embody contradictory assumptions of different paradigms;

(ii) culturally infeasible because academic research communities have vested interests in promoting single methodologies and methods;

(iii) psychologically infeasible because it requires too much intellectual effort from interveners."

The two latter points of Midgley, have been experienced in the real world scenario of this thesis (see practice, Chapter 5 for detail), whereby cultural and psychological bias were experienced across a few interventions under the action research cycles (IMT and OAG projects), and seem to have practical relevance. The attempt of this work is in fact to see if an inclusive framework can be developed that in itself promote multi-methodologies within a project context, making it important to know on what theoretical assumption systems methodologies rest. Some systems proponents emphasise learning about the nature of real-world systems; others concentrate on methodologies, based upon systems ideas and principles to intervene and change systems. This touch upon the need to understand social theory to enable understanding of systems methodologies. There are strong linkages to Haberma's theory of human cognitive interest (technical interest; practical interests; and emancipatory interest) and how these became ingrained into sub-systems of modern society. Some commentators believe that thinkers such as Michael Foucault, present

alternatives (Brocklesby & Cummings, 1996), suggesting two lineages, i.e., the work of Habermas and that cutting across Immanuel Kant and Michael Foucault. Importantly for this research question, both these strands contest socio-economic subjugation and domination, with Habermas focusing more upon theoretical approaches that can emancipate society from “worse” to better-off” states, whilst Foucault genealogy is directed at providing tools individuals can use themselves, as they see fit, to free their minds and observe how systems subjugate them.

These approaches brings to the fore, unwritten categories and rules of systems, allowing individuals to develop responsive strategies, as opposed to collectively building shiny new systems (Brocklesby & Cummings, 1996).

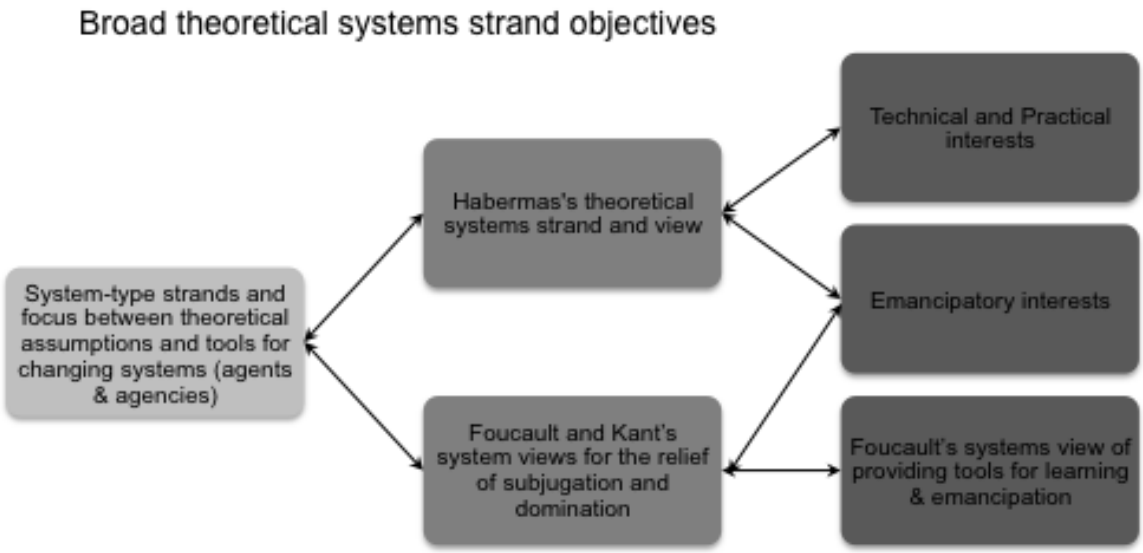


Figure 2.5 Important strands of systems orientation regarding, purpose, methods, and tools

The emancipative value appear to be evident across the lineages, speaking directly to the position of the author to enrich his own understanding and possibly that of others, so as to recognise the dynamic interplay allowed and brought to focus using systems theories. The various systems methodologies are seen as a strength, providing theoretical and practical guidance to the management sciences (Jackson, 2001), whilst having the potential of combining methodologies of different strengths and weaknesses, used under different problem situations and different purposes (Jackson, 1989b; Jackson and Keys, 1984).

Jackson sees pluralism as central to critical systems thinking (Jackson, 1987; Mingers and Gill, 1997), matured via operationalising its key ideas in a practical meta-methodology called TSI (Flood and Jackson 1991), which provide guidelines for critical systems ideas in practice via pluralism, whilst being mindful of potential coercive contexts. TSI is built around 3 phases, creativity, choice and implementation as depicted below.

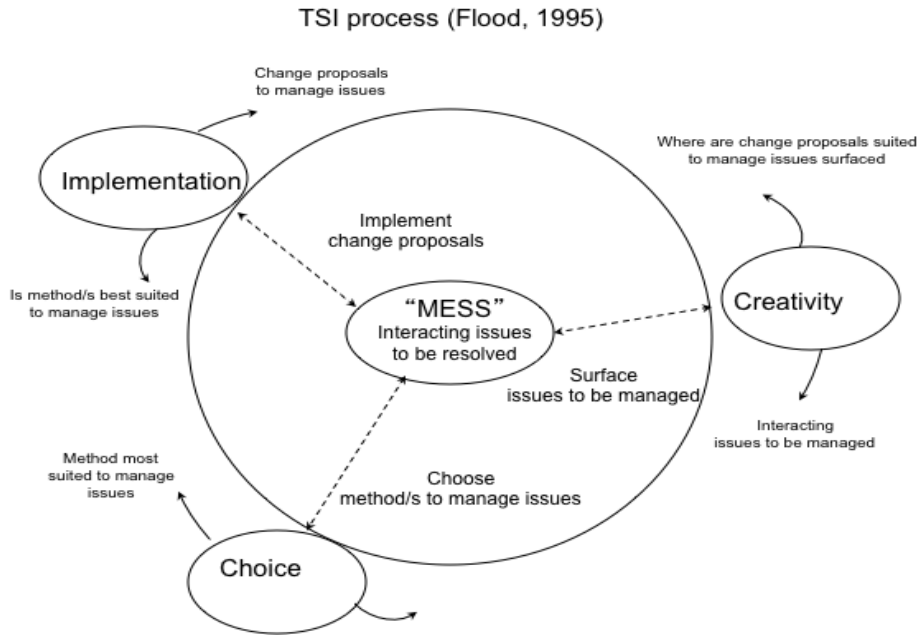


Figure 2.6: A view of the TSI methodology by Flood (1995).

The creativity phase recognises different possible views of organisations and their problems, encouraging managers and analysts to explore these through the use of images (Morgan,1986). The idea is to take a broad view of the problem situation, and gradually focus on the aspects most crucial to the organisation at the point of intervention, which is what the prototype executes as a first step (highlighting potential intervention planning through both a mechanical and system-based perspective).

The local public sector managers often dismiss systemic problem definition and planning parameters (see practice, chapter 5). Problem definition is mechanistic, usually revised after project initiation (e.g. when fleshing out the terms of reference and expected deliverables of the projects). The consequence of this practice result in a myriad of project problems that cause delays (e.g., scope creep, milestones not being signed-off, contract management problems, resulting in disputes and payment delays), across interventions. The client tendency and aversion to collaborate and provide time for skills transfer, in itself also present a difficulty. This dynamic is a practical constant in the live SA-project environment, and in a manner underscores the lack of resources (client staff and managers being spread thinly due to resource constraints; officials not having time to learn, reflect, and share with various internal or external experts, able and willing to transfer skills). The difficulty refers to whether such problems qualify to be “ill-structured”; or whether the environment is coercive, and to a degree even hostile (e.g. IMT and N2 Gateway project).

The meta-methodology of the prototype have a emancipatory commitment (improving the human condition), by increasing efficiency and effectiveness as well as liberating individuals from subjugation. Yet the very beneficiaries, across a number of the local projects are more concerned with getting the job done on-time, or ahead of time, and for as little budget as possible, with little regard for continuity and skills development.

The pressured environment not being conducive to sustainable solutions, thus tend to collapse, once the vendor support (project consultants) are withdrawn.

The prototype relies upon the citation by Jackson's (2001) "there is nothing wrong with using a wide selection of tools, as long as they are employed according to an explicit logic", aligning itself with the thinking that methodologies can and should be decomposed if and when appropriate (see example of system dynamics model, used for cognitive mapping - Mingers and Brocklesby, 1996). Systems practitioners should be allowed the freedom to tailor tools if they are to deal with the complexities of the problem situation they are seeking to intervene in and the exigencies of that situation as it changes.

Jackson's (2001) expanded view of generic system methodologies based upon "functionalist"; "interpretive"; "radical" rationales by Checkland & Scholes (1990)

Hard/ Functionalist methodology	Soft/Interpretive methodology	Emancipatory/radical methodology
An assumption is made that real world is systemic	No assumption that real world is systemic	Assumption that real world can be systemic, in a manner alienating humans/groups.
Analysis of the problem situation is executed in systems terms	Analysis of the problem situation is designed to be creative and may not be in terms of systems terms	Analysis of the problem situation is designed to be reveal who is currently systemically disadvantaged
Model of problems built to gain insight	Models used to interrogate perceptions of real world & structure debate about feasible changes	Models used to reveal sources of alienation & disadvantage
Models used to improve real world problem & for design purposes	Process of intervention is systemic, never-ending	Process of intervention is systemic, never-ending
Quantitative analysis is useful since systems obey mathematical laws	Quantitative analysis not greatly relied upon, except for clarification	Quantitative analysis may be useful to capture biases in existing systemic arrangements.
Process of intervention is systematic & aimed at best way to achieve goal	Process of intervention is systematic & aimed at best way to achieve goal	Process of intervention is systematic & aimed at best way to achieve goal
Intervention is based upon expert knowledge	Intervention is best conducted on basis of stakeholder participation	Intervention is conducted in a way that the alienated begin to take responsibility for the process
Solutions are tested on their efficiency & efficacy	Changes evaluated upon their effectiveness, elegance and ethicality	Changes designed to improve the position of alienated or disadvantage people ito ethicality & emancipation.

Figure 2.7: Summary of Jackson's matrix of system methodologies(Jackson, 2001).

This however does not suggest ultra-pragmatism, nor allow the theoretically uncontrolled employment of tools. At any moment during an intervention the use of the tools should be deployed within a sound theoretical rationale ensuring compliance to the rules of the methodology serving a particular paradigm. The maintenance of a conscious link between methodology (as the study of the principles of method used) and the employment of the tools, allow us to learn about the efficiency and effectiveness of methods, models and techniques.

The version 1 prototype uses various aspects and elements of systems and management methodologies, like Process Modelling incorporated into the Process architecture level of resolution; and Systems Development aspects informing the Information Communication Technologies level of resolution.

The prototype uses both hard and soft system elements, such as for example, it's primary axiom ***(prototype= f{ f(sa) x f(ta) x f(oa)})***, suggest that any social system is comprised of the core interconnected sub-systems, which consist of a unique combination and arrangement of: future-based aspects or planning, located in the strategic architecture(sa); whilst it usurps classic hard systems concepts such as Process Modelling and Systems Analysis for purposes of defining system elements having distinct or finite potentialities, like for example a procedure or software, which in the case of the proposed model, resides under the tactical architecture (ta). Another typical hard systems aspect relates to the operational architecture (oa), which adopts the basic Project Management Body of Knowledge (PMBOK), to ensure a systematic approach when implementing a collective of activities.

Importantly, as an integral sub-system of the tactical architecture, the prototype incorporates the human or people aspect of social systems, in order to relate to how people influence and co-create their environment, whereby insights from Maslow's hierarchy of needs explicate the

functioning context of the human element. This may seem misplaced, but as the tactical architecture level of resolution indicates, its core sub-systems are that of People, Process and Technology.

These specific sub-system components were adopted mostly because of it's common or default industry standard suggesting that as enablers they form the core operational requirements of any social system. Furthermore, since industry is accustomed to use these descriptive terms, it was seen as an added advantage as system constructs are much less prevalent and are often seen as being theoretical, or even threatening to an extent, for would be adopters and management in general.

The prototype focus upon complimentary aspects of methodologies and systems in general, thereby presenting robustness and unification, which is necessary at project level, locating itself on the plane of SSM understanding in dealing with messy problems having definitional weaknesses, reflecting the local context, like for example the OAG project that underwent multiple leadership changes. All of which suggest a "messy" situation, whereby key client agents who are to ensure the institutionalising of the solution, meaning the "A", "T" and the "O" of SSM's CATWOE, have in this research, been a distinct problem in their commitment, understanding and capacities, undermining the potentially lasting effects of solutions.

Project experience in all instances reveal, once systemic problem statements are revealed to clients, it cause additional challenges (e.g. Request to amend the terms of reference of the intervention; Governance protocols not being followed; Project variation orders), all of which seem to favour an emancipatory or radical rationale. The pluralism of the prototype is illustrated using the SoSM in context of both practice and research of the prototype.

Perspective of how this body of work view the challenge of pluralist models (Jackson, 2001; Checkland & Scholes,1990) regarding Practice & Research of systems methodology & the development of the Prototype (BAT).

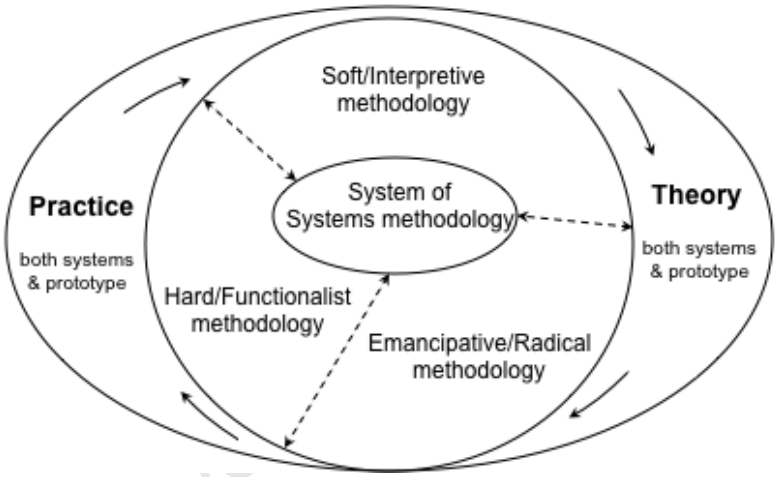


Figure 2.8: Inclusive system science viewpoint, incorporating various pluralist methodologies (e.g., Jackson, 2001; Checkland & Scholes, 1990)

Figure 2.8, takes the pluralist methodological ideas of Checkland & Scholes (1990), and Jackson (2001) and view these in terms of their synergies and value-propositions influencing practice, and research, both of which inform the prototype development. Commentaries by Churchman (1982), and Jackson (1991), note the difficulty to choose a specific

methodology over another, for a specific situation with absolute certainty of being the appropriate choice. Flood and Jackson (1991), wrote: "It follows that the choice of systems methodology should be informed by the “systems of systems methodologies”, it should not be determined by it". Local contexts seem to require elements of soft, hard and emancipatory aspects, particularly since first impressions generally becomes distorted as projects unfold (e.g. where senior managers delegate vital project activities to staff that are ill-aware of the original project discussions; multiple leadership changes).

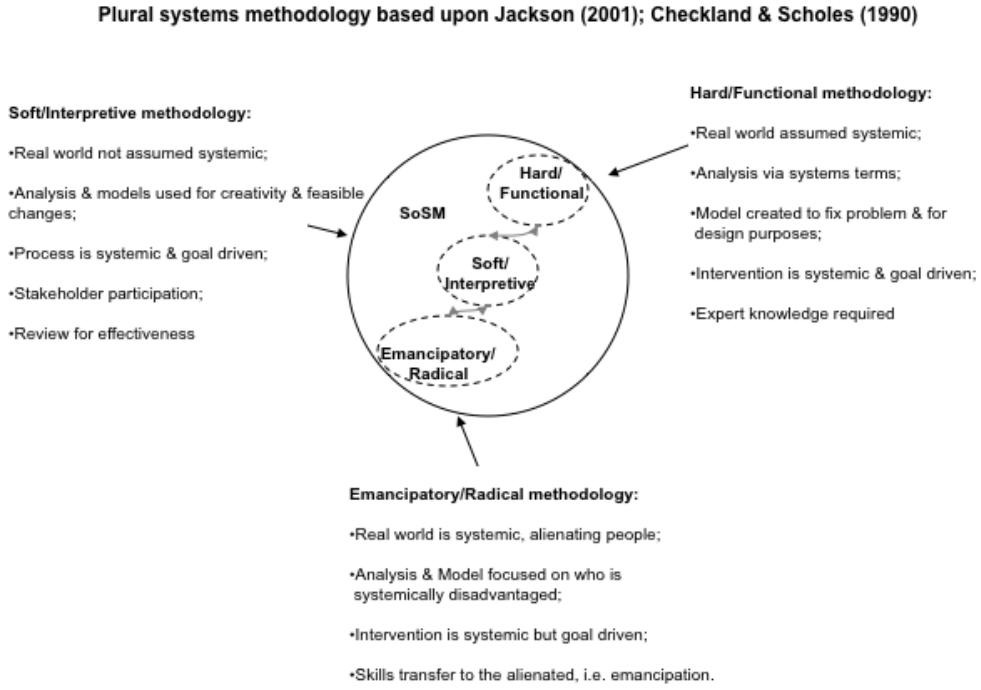


Figure 2.9: Variation of pluralism method derived from Figure 2.6

Figure 2.9 depicts the plurality of methodologies, and considering various forms of local subjugation, the prototype lean toward an emancipatory rationale.

Figure 2.9, is a variation of figure 2.8, and illustrate how the prototype is positioned in context of "absorbing" various elements of accepted systems models.

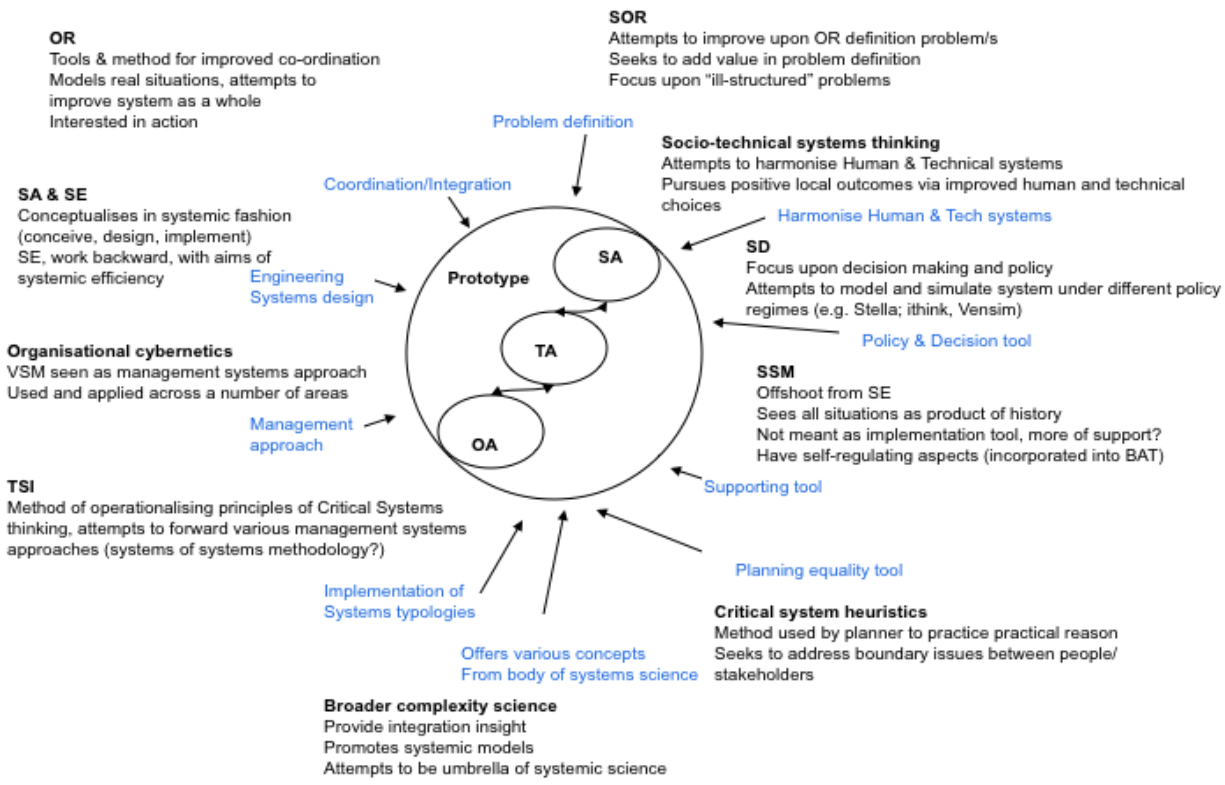


Figure 2.10: Pluralist systems notion carried across into the development of the prototpye derived from figure 2.9

The reader may find figure 2.10 overly rich, however the intent is to explain how the prototype was derived and conceived, whilst highlighting the potential of "future absorption" as a function of further research. As will be shown in the following section, the prototype retain elements of some methods and toolsets depicted in Figure 2.9. (e.g. elements of SD, SSM, and CST).

To create better support for this strategy, the diagram contain blue text, which seek to highlight the value each of the systems methods, tools and approaches lend to the thinking behind the prototype (e.g., OR and SOR elements used under the Strategic Architecture as it relates to integrating system elements and problem definition, respectively; Under the Tactical architecture, the use of socio-technical systems thinking elements for its ability to harmonise human and technical systems).

The development strategy of using the prototype to improve the prototype, is similar to the work by Quinn (2004), and used to support the approach. His book "Building the bridge as you walk on it" is about leadership and change, both personal and organisational. He cites leadership to be a temporary dynamic state, redefining how we think about, enact, and develop leadership; observing we are mostly not in the fundamental state of leadership (Quinn, 2004), and that most people, whatever their position, spend the majority of their time in the normal state, as opposed to the leadership state. Although they may claim they are committed to changing some undesirable condition, they actually remain in comfort zones (path of

least resistance), externally driven (complying with existing social pressures), self-focused (egocentric) and internally closed (neutralising external signals for change). When faced with a crisis, people are forced to make deep personal change, and move forward without control, in effect the person has to learn to "build the bridge as he or she walks on it." In such a process, people tend to move from the normal state to an alternative state in which they become focused, outcomes based, driven, and externally open, thereby hightening awareness, integrity, learning, and self-empowerment, resulting in being more influential, a condition he refers to the fundamental state of leadership (Quinn, 2004). The work by Quinn is important in two aspects, one relating directly to the “building of the prototype while executing it”, and the other relate to institutions of learning and leadership issues. His reflections on development are important since most Business schools and corporate universities claim to teach leadership, but tend to stay in their comfort zones by over emphasising pedagogies of analysis and imitation to alter student thinking and behavior. Quinn (2004) suggests that "Developing leaders is not about getting them to imitate the thinking and behavior of other people who have been successful". As will be explicated in subsequent chapters, the “mobility” of problems, meaning the capacity of problems to change in its nature, or are fluid in nature, such as when say resolving one aspect of the problem, it may prompt the creation of other complicatons and challenges, have been encountered frequently in practice. Additionally, the notion of having a

"perfect solution" or what is often called a "silver bullet" is both irrational and ignorant (Gharejdaghi, 1999), borne from a mechanical worldview.

This was a key consideration in the solution development, and implied the design and development of the prototype to acknowledge the dynamic and complex nature of social problems. The mechanistic paradigm results in the common practice whereby we try to use and adopt solutions that worked in past interventions, and apply these to new interventions, despite the context and enabling architecture of the new intervention being different. Added to this, the Habitus of the client, team members, stakeholders and interveners, make for a dynamicism of high complexity. Considering these elements, the wicked nature of our social problems tend to be better revealed. Wicked problems originally related to social policy challenges, whereby sound scientific basis for confronting such problems were deemed impossible, since traditional science generally deal with tame problems. Social policy problems cannot be definitively described; nor ensure that pluralist societies can have what is called undisputable public good; nor have an objective definition of equity. This consequentially imply that policies responding to social problems cannot be meaningfully correct or false, making it impossible to talk about optimal solutions, or to have definitive and objective answers to these social problems unless severe qualifications are imposed first (Rittel & Weber, 1969). Rittel and Weber formally described the concept of wicked problems in a 1973, contrasting "wicked" problems with relatively "tame," soluble problems in

mathematics, chess or puzzle solving. The phrase describe a problem that is impossible to solve due to incomplete, contradicting, and fluctuating requirements. These conditions thereby create a complex dynamic of interdependencies, which when resolving one aspect of a wicked problem, create, or reveal other problems. Conklin (2005), generalised the concept to extend beyond planning and policy, identifying typical characteristics of such problems (e.g. they have no stopping rule; there is no right/wrong answer; are unique and novel; have no given alternative or definitive solution). Examples of wicked problems are in economics, environmental and policy areas, or problems that require many people to change their mindsets and behaviors, like healthcare; education; or nuclear weapons. Solutions to resolve wicked problems have been offered in the form of Interactive Planning (Ackoff, 1988), Design Rationale (Rittel & Kunz, 1970), and Design Thinking (Herbert, 1969).

Hoebeke (2000) cites our human limitations like our 3-bit parallel processing brain, and ability to take small-scale decisions and actions, may have huge consequences. The consequential effects are mostly unintended because we deal with “non-trivial machines” (Sommerhof), or Autopoeitic systems (Maturana & Varela), making the notion of control and predictability preposterous (Hoebeke, 2000). The essence is thus a mechanical orientation to solve a systemic problem, which have been highlighted in this work and recorded as a specific challenge made more demanding in the local context.

The only way agents and agencies can improve is by relating to themselves being part of variously constructed self-regulating networks of relations, which underlies the design and integrated sub-systems of the prototype. Our poor understanding of this is what makes life both frustrating and fascinating (Hoebeke, 2000), noting Checklands "epistemological stance" as a key insight in terms of any framework and the reality to which it is applied, implying that a map is not the territory, and frameworks are mere tools of language, and symbols of debate and interpretation (Hoebeke, 2000). This view mirrors the finding of this research as well, whereby interventions or projects that were undertaken, often result in client's questioning, or refusing to look beyond their very rigid views of organisation, its perceived boundaries, and find it very difficult to relate to systemic networks or extended value chains (EVC's). Current systems tools, like for example Beer's VSM is accepted as seminal work, but usually requires deep systems understanding for managers to implement and enforce, creating resistance to adopt such models in its entirety. Furthermore, based upon the practice results, using certain or some key elements, like variety, are easier absorbed into agents, as opposed to trying to embed entire systems models.

Hoebeke (2000) suggest frameworks are concepts to convey truths and falsehoods, that are used and abused by human creativity, covering collaboration and competition at the same time, being similar to Checkland's Human Activity System (HAS). The prototype shares such views and was developed to make accessible certain relevant system

theories and models, in a way that is practical to managers, having little systems background, whilst conveying the interconnectedness of systems. Hoebeke (2000) says work systems to be the real world where people undertake activities for mutually influencing each other and the environment. This is less refined than Checkland's view of Transformation Process, which articulates defining both selection and purpose of people. Hoebeke uses these two arguments to highlight that individual activities cannot be discussed without defining processes and expected outputs, a common mistake made between people in organisations, and the allotment of functions to the people. The prototype draws support from this argument as it encourages the recognition of enablers (Process, People, Technologies) to be integrated and considered as a key syb-system comprising the "tactical architecture" in terms of the naming convention of the prototype. It also note's the importance of processes, which in Hoebeke's framework is neither a function nor a position, but a transformational process of meaning, which tend to relieve management anxiety in terms of thinking that they own a process, as opposed to contribute toward it (Hoebeke, 2000).

He asserts all work systems to be technically self-regulated, and that external controls are mythical features having huge costs, that are completely inadequate, observable from Presidential work systems to that of the Gardener's work system, and claim that those who believe they can control from the outside, are asking to be cheated by those they believe to

be under their control, creating a self deception between the controlled and controllers (Hoebeke, 2000). This is another practical experience on the projects whereby oversight agents and agencies, generate volumes of reports and data, which are never truly accessed, resulting in the waste of resources Hoebeke cites For example ignoring value from audit, validation and enforcement information processes; expensive oversight structures for monopolies like Telecoms and Electricity, without using the oversight and regulatory gains in terms of development, innovation, and most importantly, savings to the SA public.

Hoebeke (2000) observes organisations are erroneously described as pyramids of hierarchy, suggesting they are interactions between various agents, which are not anonymous sociological entities, like markets, classes, rich, poor, nations or shareholders. He claims these ideological devices as creations that justify divergent outcomes of our collective action (Hoebeke, 2000), and uses the word “Domains” to relate to the work systems and process levels of his model. The value-add; innovation; value-system; and spiritual domains comprise his 4 domains, each having various transient lengths. He proposes not to assume workers are only found in the lower domains and thinkers in the higher domains, instead an agent may contribute to any domain, and communication helps to locate in which domain a specific agent may be working in. His model adopts recursive levels by adhering to VSM’s elementary description – “in a recursive organisational structure any viable system contains and is contained in a viable system”.

The prototype supports this perspective, suggesting that an agent's capacities and abilities cut across organisational boundaries, meaning people have the capacity and ability to operate between the various levels of resolution contained in the prototype. The fact that people may not physically do this, is often due to explicitly defined activities, and the prevailing organisational culture among other factors, also supported by insights from Quinn (2004), relating to leadership and innovation noted before.

Hoebeke notes the tensions in organisational literature between conservation (status quo) and adaptation (improvement efficiencies), due to seeing internal and external environments as two separate realities, as opposed to a more transactional co-existence (Hoebeke, 2000). He uses the disconnection between managers in ivory towers, and to workers, usually blamed for resistance to change; as well as the common feature whereby external consultants drive projects in the absence of internal participation. Both of these aspects have been seen in practice during this research, most notably the latter, causing interventions to suffer greatly. All of the considerations raised in this section seeks to highlight theoretical and practical systems ideas, which efectively represent the "specifications" of the prototype. The following section takes these systems-based specifications to develop the version 1 prototype.

2.3 Specific theory elements reflected in the prototype

This segment presents the pertinent conceptual elements discussed in the literature, directly related to building and populating the prototype.

Ludwig von Bertalanffy's, General Systems Theory (1968), is considered essential reference material, citing that a system consists of many parts, with the whole system being greater than the sum of the parts. This is the emergent concept that the prototype wish to portray when engaged in an intervention by highlighting the integrated and dynamic nature of key sub-systems inherent to the system-in-focus.

It raises the importance of relationships between and within sub-systems as vital, and promotes a tool that contain both systemic and systematic elements, locked into a dynamic systems interplay. The communication or data exchanges between and within sub-systems and the environment adopts attenuators and amplifiers, but the protoype is not prescriptive regarding how and what should be used as amplifiers and attenuators, other than highlighting typical examples of what may be used as such, like email, mobile phones, effective use of administration, marketing and sales material, may all be functions and tools that can be used to filter noise, and enhance relevant data between and within sub-systems.

Hard system models are used for well defined, structured problems, seen to be opposite to soft systems that sees problems as being ill-defined and badly structured texts.

Hard systems approaches like Systems Analysis and Operational Research adopts a view that problems are essentially clear and defined, having one ideal or optimal solution, by implication therefore suited to "simple systems" or systems that are mostly of a technical nature like infrastructure projects. The prototype subscribes to the notion that all interventions inherently have both Hard and Soft system characteristics, and as such contain aspects of both systematic and systemic elements; like the project management body of knowledge (PMBOK) model contained in the operational architecture of the prototype, essentially a hard systems model. Checkland's view similarly recognise systems thinking to be constituted of two complimentary aspects, this being Systems Analysis, and Systems Synthesis, which can be argued to essentially be, hard and soft systems respectively. This motivation is used to support the prototype's use of soft and hard systems methods to provide systemic understanding and systematic problem resolution, which are vital once interventions have better defined parameters. Operational Research (OR), also called Management Science (MS), is a set of methods and tools to enhance conducting and co-ordinating organisational operations, with origins dating to post Second Wold War, having notable contributions from Kirby and Capey (1998); Ranyard, (1995); Cook and Shutler (1991). OR is characterised by modelling the real world, in order to create optimal operations (Hillier and Lieberman, 1990; Ackoff and Sasieni, 1968; Duckworth, 1962), whilst Soft Operational Research stems from traditional OR's perceived weakness in dealing with systems that do not enjoy

structured hierarchy, data integrity, and having expert human resources (Rosenhead, 1989).

Real-life's "ill-structured" problems (Simon, 1973), cast doubt upon assumptions of classic OR modelling (Rosenhead and White, 1996), and suggests improved problem structuring methods (Rosenhead 1989; 1996), like Interactive planning; Strategic choice approach (SCA); Soft Systems Methodology (SSM); all of which may be useful in terms of problem definition difficulties in the local context.

Much of the systematic elements of the prototype stem from the arena of Systems Analysis (SA), and Systems Engineering (SE). Since SA is the study of interacting systems, to provide decision support, it's methodology require the analysis (to enquire), and subsequent synthesis (to provide ideal solutions) of systems or problems that can be generally thought of as simple systems, and not suited for more complex social interventions. The logic of systems analysis was useful and partly incorporated into the implementation model of the prototype, which comprises Consult, Design, Deliver, reflecting both aspects of systems analysis prior to implementing any solutions. Systems engineering (SE) in turn strives to conceptualise in a systematic fashion the general pattern of conceiving, designing, and implementing complex technological systems like, Settlements, Ships, and Power stations, with many approaches being developed in the 1950's and 1960's (Miser, 1995; Checkland, 1981; 1989; Miser and Quade, 1985;

1988). The SE method generally starts with defining the purpose of the object or system, and proceed to work back from these specifications to design a system that would achieve the outcomes efficiently (Jenkins, 1969), implying a sort of reverse engineering.

It is used to design, construct, and operate “works of public utility”, by integrating and optimising multiple systems. The prototype uses the SE aspect of project management body of knowledge (PMBOK), under the proposed operational architecture level of resolution, for the implementation of interventions.

This serves two objectives, one being the pervasive adoption and understanding of basic project management; the other being the systematic procedural steps enforced by the approach. Other SE dimensions such as Requirements analysis, Design review, Verification and Validation, relates to SA aspects and as such are reflected in the cyclical implementation model of the prototype, i.e. Consult, Design, Deliver phases.

The rich-picture development promoted by the prototype as part of the first phase of interventions, tend to reveal potentialities that have not been accommodated for in the early stages or planning of the intervention, e.g. the limited information and data usually contained in requests for proposals from the pubic sector. This has been used pro-actively on all projects, whereby elements deemed to be outside of the intervention mandate, are

highlighted as risk areas that the client is to monitor closely. This activity can be seen to imitate the alegedonic alerts of the VSM model, also used as pro-active or predictive alerts. Two case studies revealed this in the most fundamental manner whereby prototype-based planning provided more than 18 and 12 months advance notice of key concerns. The one project related to delays in creating a collective funding pool between the three spheres of government for a pilot project to enhance housing service delivery (see N2 gateway project).

The other project relate to shallow interpretation of new legislation (see OAG project), where client agents were cautioned about the pervasive national influence the intervention held.

Both approaches (SA and SE) present a general way of thinking about practical situations, and as such have a strong influence in the prototype, key being the extension of the research and vocabulary of Systems Analysis and Systems Engineering, to make it more suitable for applications dealing with technical systems (Information Technology) specifically, as well as a general management, organisational and social situations (Checkland, 1981; 1989).

Organisational Cybernetics, viewed as a management systems approach, promote the Viable System Model (VSM) designed by Stafford Beer (Flood and Jackson, 1991a; Jackson, 199x; Espejo and Harnden, 1989; Beer, 1979; 1985). Wider viewpoints have been recorded regarding concepts such as Socio-cybernetics, Autonomy, Autopoiesis, Self-

organisation, 2nd order cybernetics, and observing systems (Achterbergh, et al., 1997; Willke, 1990; Geyer and van der Zouwen, 1986). Beer (1975) defined cybernetics as "the science of effective organisation", where he promotes the notion of a "viable system" as the desired or most effective organisational structure, having adaptive qualities needed by such systems to ensure their continued survival and growth (Beer, 1979; 1984). Various applications have been recorded (Espejo and Harnden, 1989), such as to diagnose whether the organisation fulfills VSM criteria of viability. Other applications include information systems (Murthy, 1994); Developing a robust management structure for complex computer networks (Latin and Goodman, 1991); Organisational vision, mission and structures (Flood and Zambuni, 1990; Leonard, 1989); Organisational theory insights such as reinterpreting the notion of organisational effectiveness (Schwaninger, 1990).

VSM is composed of 5 core interacting sub-systems that can be mapped onto any organisational structure. In general, VSM systems 1 to 3 are focused upon operations or the "here and now". System 4 focuses upon planning, future, or strategic oriented roles often called the "there and then" and deals with potential perturbations from the landscape. System 5 is seen as performing some form of control and balance between system 4 and systems 1 to 3, meaning to perform control or balance in terms of the needs from the actual operations (tactics) and the strategic issues, and gives overt policy and governance direction to complete the viable systems

model. The prototype recognises the importance of what VSM encapsulates regarding viability, whereby systems 1 to 5, are mapped onto typical organisational structures, and seek to embellish such structural viability by way of integrating the thinking of agents and agencies regarding the various elements or systems within their domain. As an example, the prototype requires the review of all planning and future-based thinking, by virtue of linking the strategic architecture comprising all forms of planning, to the operations of the organisation, which is enabled through the nested sub-systems under the tactical architecture, instilling the interconnectedness of the collective, which is implemented via the operational architecture that contain systematic and hard systems principles.

The prototype being a design and delivery support tool, seeks to aid multiple agents or stakeholders to understand where they fit into the overall system in terms of functional requirements, but does not propose any structural aspects of organisation. It tends to support the VSM model, by appreciating systems 1 to 5, to be the entire organisational system-in-focus, that must produce various pieces of work, in order to have some form of efficient output in order to remain viable. The thinking drawn from VSM is by way of alerting stakeholders to where and how they fit in the system-in-focus, by highlighting the interconnectedness of the organisational sub-systems, not from a structural view, but oriented from function and procedure, which effectively are what agents within

organisations, are to do, how they are to do this, and why they need to do this for their viability as a collective.

VSM includes the landscape and algedonic alerts (alarms and rewards) that permeate throughout the system and levels of recursion for purposes of management performance (good, bad or average). The pro-active alerts are believed to be adapted from the architecture and functioning of the brain's central nervous system, whereby Systems 1 to 3 replicate the autonomic nervous system; whilst system 4 mimics cognitive aspects; and System 5 being the higher brain functions like, reflection and optimal decision making. Beer also incorporates Ashby's law of requisite variety in his follow-up work in the "Heart of Enterprise", and cover a variety of elements: Regulatory aspects; Principles of organisation; Recursive systems theory; Law of cohesion; and Axioms of management, so as to ensure sufficient variety exists in viable systems.

The prototype takes the above into account in terms of providing insights of the collective dynamic of systems 1-5 and how they are co-dependant and impacted by the intervention itself. The prototype expresses these in terms of the dynamic functional dependencies promoted under the sub-system architectures. The attenuators, amplifiers, and sub-system boundaries contained in the prototype, at all levels of resolution support the VSM landscape or boundary principles.

The prototype does not prescribe any structural improvements, and instead use procedural and functional elements to provide illumination of systemic dynamicism and interconnectedness to intervention participants.

The prototype grounding also lean toward 2nd order cybernetics, in the sense that its proceeds from the premise that absolute control and predictability is impossible, and that social systems contain various types of systems, like simple systems, complex systems, complex adaptive systems, all enmeshed into each other. As such, 2nd order cybernetics is seen as being more influential to the conception and ongoing development of the prototype. Heinz Von Foerster, founder of 2nd order cybernetics is known for his dictum “life is studied in vivo not in vitro” which required the development of a higher order or meta-cybernetics, meaning cybernetics for cybernetics. This is much like the notion of an unbiased observer, whereby all scientific observation, are invariably impacted by the very presence of the observer, which raises issues such as reflexivity, self-reference and the diffusion between subject-object, and what quantum mechanics call quantum entanglement.

Von Foerster notes that cybernetics adopted the mind as its model, and realised that for a brain to document any complete theory, it has to include itself accounting for the theory, in the theory itself, hence the view that it is cybernetics for cybernetics.

Herbst (1974) traces the development of Socio-Technical Systems back to the 1950's in the UK coal mining studies, revealing how new organisation of work actually created psycho-somatic disorders, conflict, absenteeism, and lower productivity. Trist and Bamforth (see Herbst, 1974), viewed these manifest problems as a consequence of the social structure of the work system, impacted by the technological system, and suggest optimised performance by modifying both the technical and social systems in a suitable way. This speaks to the notion of sub-systems integration incorporated in the prototype, specifically core organisational enablers such as Process, People and Technology sub-systems under the "tactical architecture", highlighting systemic integration of technology systems and people, seen as vital under socio-technical thinking.

System Dynamics (SD), pioneered by Forrester around 1958 (Dash, 1994; Keys, 1990; Forrester, 1958), present powers of simulating systems in order to reveal how it behaves under various policy regimes, using a range of tools from desktop spreadsheets to specialised software, like Stella®; iThink®; Vensim®. Importantly for the prototye, it adopts concepts from Control Theory and Control Engineering to Management, so as to rectify the tendency to see management issues as isolated problems at various points in time.

Forrester makes an insightful observation in that “Man lives and works within social systems” (Forrester, 1961 and 1969), thus a broad and encompassing system view that has many parts, operating together for a common purpose. He promotes understanding it’s processes and structures, depicted using causal loop diagrams and mathematical models in order to optimise system outcomes. Key SD elements such as: Confirm or identify the problem; is reflected in the prototype methodology that dictate as a first step, the review of the problem statement of the intervention or project mandate. This rich-picture notion affirms the intervention outcomes in relation to the client (agency’s architecture), and environmental context, which tend to flush out implicit assumptions, omissions and related elements that were not accounted for in the original project or intervention planning, typically being a request for tenders and proposals. For example, it reviews the vision, mission and strategic objectives of the organisation, and links these to the intervention outcomes.

This step highlights how project interventions are likely to affect organisational enablers, specifically being people, processes and technology (tactical architecture). This information is used to develop a detailed project plan, to be delivered under the Operational Architecture. The base-line project plan of the intervention serve as an advance notice to participants of what is expected from all role players in terms of the intervention. In terms of SD language, the prototype mimics the feature of

"Developing the dynamic hypothesis" to identify the root cause/s of the problem (tenders and terms of reference published by client verusus the prototype "As-Is" problem statement).

Soft Systems Methodology (SSM), developed by Checkland, is a systemic methodology to learn and solve problems of a subjective nature (Checkland and Poulter, 2006), acknowledging that reality or real life is comprised of multiple messy systems that does not allow for perfectly formulated problems, and that agents and agencies actually form an intimate part of the problem itself. SSM extends from Systems Engineering (Checkland and Scholes, 1990; Checkland, 1981), but introduce a process described as a continuous cycle of learning, be it for an individual, a group, or an organisation (Checkland, 1995). It perceives any situation as a product of historical events, which usually has no unique features that manifest the situation, however the situation is expected to contain "would-be improvers" (Checkland and Scholes, 1990). SSM viewpoints are used to create root causes (from certain perspectives), to develop conceptual models, which are essentially based upon self-regulatory aspects (Checkland and Scholes, 1990).

SSM can lead to purposeful improvement of problem situations, and assist with sharpening views and making choices of action more explicit (Checkland and Scholes, 1990).

The power of SSM appear to be embedded in its axiomatic notions that: (1) Problems do not exist in isolation and are affected by the human mind of agents or individual perspectives, and thus require participants to look at the situation as opposed to the problem; (2) The systemic nature, and complexity of problems are cross-boundary or what is called “messy” problems; (3) That each agent or stakeholder may have different, yet relevant perspectives of the same problem. The improvement of SSM is its systemic perspective, over SE’s systematic disposition. To this end the prototype imitates SSM axioms 1 and 2, in terms of its own primary axiom, expressed at the highest level of resolution: Prototype = f{ f(sa) x f(ta) x f(oa)}. The prototype axiom suggests that any social or viable system are comprised of three basic sub-systems at its primary level of resolution, these being the strategic, tactical and operational architectures. Each of these higher-level systems are comprised of multiple sub-systems, who in turn may have it’s own sub-systems at lower levels of resolution. The nature of how these sub-systems are arranged and how they interact both between sub-systems themselves, and the permeable boundaries demarcating the landscape, are managed by attenuators and amplifiers located between sub-systems and between levels of resolution.

This highlights the inherent unpredictable nature of the overall system behaviour, which is referred to as “messy, wicked or dynamic problems” in systems literature, noted to be highly prevalent in the local context.

The prototype, like SSM's initial work involve engagements, interviews and meetings to gain an understanding of the problem situation, which is finally represented by the use of "rich pictures" that articulate the problem statement within the enlarged systemic pattern, wherein the problem resides. The prototype imitate this thinking, albeit in more of a systematic manner by linking the strategic, tactical, and operational architectures, within the current landscape, which is then used to map both the problem statement in terms of the various systems and sub-systems that it impacts, subsequently revealing or leading to a more robust solution framework. SSM promote development of conceptual models of the selected or affected systems, which are then debated through what SSM calls an appreciative process, creating team consensus. The prototype's implementation model is seen to support the appreciative process by way of developing a systemic problem statement, which is called the "As-Is" being a snapshot of the current situation. This is then used to develop a more detailed solution framework, called the "To-Be" or "future state" in terms of the naming convention of the prototype. As an intervention guide, the prototype uses the problem statement review and solution framework as a means of acting as the appreciative process, whereby both the problem, and its proposed solution is attained through a collaborative engagement between stakeholders in any intervention.

SSM uses the acronym "CATWOE" to list the various perspectives to be considered when developing the rich picture, these being, **C**ustomers, **A**ctors or **A**gent, **T**ransformation Processes, Perspective or prevailing

worldview, **O**wner of intervention or problem, **E**nvironmental constraints. The prototype consider these aspects, but are not delineated in such a neat manner, for example, the customer is implicit in the prototype since the very notion of a social systems viability is that customers have a utility for any of its products or services, but assumes a less obvious role, and perhaps should be considered as a potential future enhancement. The prototype, like SSM, try to deal with messy problems, however, in the field, the key agents to ensure the institutionalising of the solution, meaning the "A", "T" and the "O" of SSM's CATOE, have in this research, been a distinct problem in their commitment, understanding and capacities, making the potentially lasting effects of the solution, be more short-lived. Importantly, the prototype does not differentiate between soft and hard problems, but perceives all problems to contain elements of both.

This means that although the original and even subsequent variations of the prototype, contain more systematic constructs and elements as opposed to systemic ones, it seeks to absorb both hard and soft system methodologies, such as for example, the strategic architecture that uses simplistic and systematic strategic planning aspects, whilst the tactical architecture resolution, uses both systematic process modeling techniques, as well as the softer individual capacities under the process architecture and people architecture sub-systems respectively. Also, the use of project management principles, a tradition from the hard systems area is used under the operational architecture for its value of activity based procedures

(e.g. Project Plans, and Work Breakdown Structures). It has been documented that SSM is well suited for treating definitional problems when confronted with complex situations, and to have agents see the problem differently. Typical challenges of documented SSM case studies include problems such as for example, how to improve an educational system, how to resolve costly healthcare challenges, how to improve welfare agencies or systems. This is typical of the SA public sector environment where agents and agencies suffer from having divergent perspective of both the nature, and extent of all its service delivery challenges. The prototype uses the conceptual plan, but extends and integrates this aspect into the solution, thereby creating the linkage between the softer systems planning related methods, to the hard systems aspects of practical activities and systematic steps.

The rich-picture generated by reviewing the strategic, tactical and operational architectures, “flushes” out the inherent planning and enablement capacities resident within the client domain, generating a wider and deeper problem statement, which, once signed-off via project governance structures, are implemented as the refined project mandate. This is especially important since local public sector tender documentation and problem definition contained in the request for proposals mostly do not appreciate the wicked nature, nor the interrelatedness, and the complexity of their challenges (see visual example of the OAG project below).

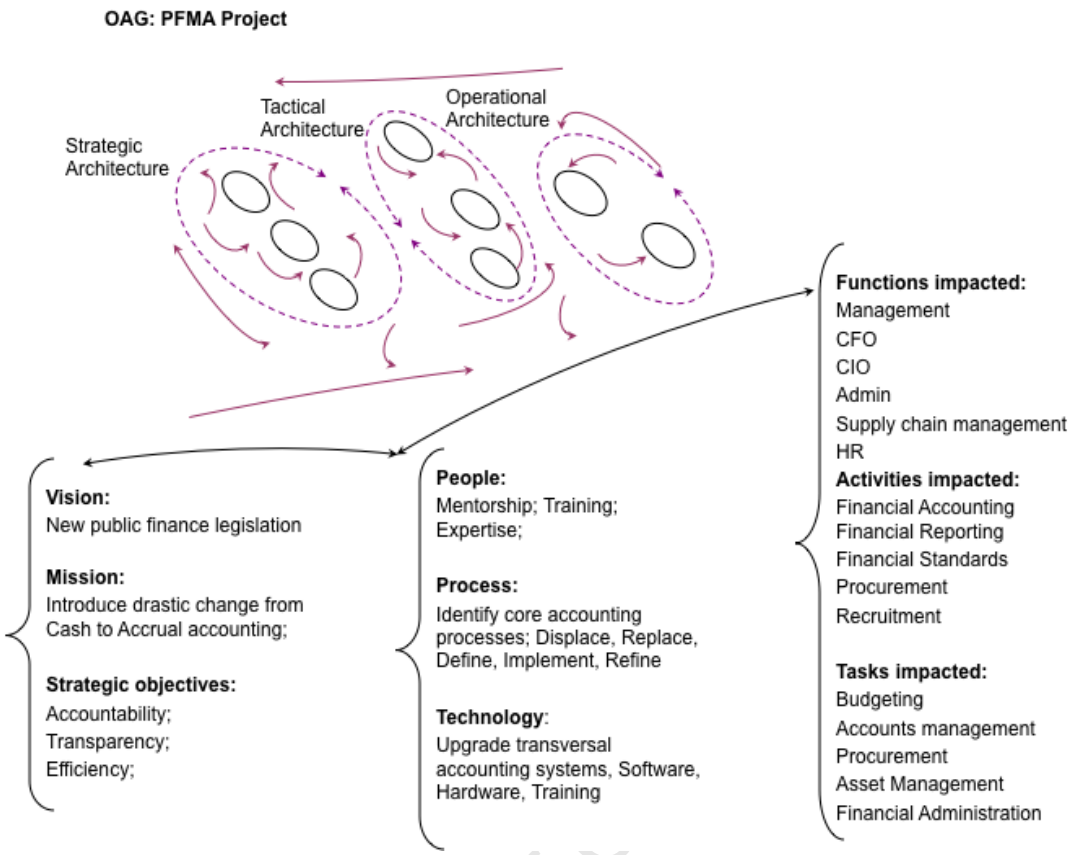


Figure 2.11: Example of systemic problem statement from practice (OAG project chapter 4)

The interventions desired outcomes and project objectives form part of the "To-Be" state under the prototype. This is the benchmark of the intervention in terms of the outcomes and how the attainment of these will enhance the client's strategic objectives, forminng part of measuring the contractual obligations between client and service provider. As noted, it moves project participants away from a mechanical perspective toward a systems perspective by generating a deeper and wider problem definition, the counter intuitive responses of which are documented in chapter 5. SSM does not assume management to be reserved for a specific level or class

of worker (supervisors or managers), instead managing is appropriately seen as an activity performed by all agents, at all levels of granularity or hierarchy. This is a vital aspect and a critical lesson from this body of work, whilst being supported by the leadership research and development from Quinn (2004), citing that leadership is not the preserve of senior or high ranking staff, but evident at all levels in practice. His research suggest all of us have innate leadership capacity which we call upon and rely upon in certain conditions, such as when we are in a threatened position, like for example an emergency fire or flood, or when loss is suffered, or if duty actually requires it, like a hostile, warring or fighting contexts.

The body of knowledge subsumed under complexity science cover a vast number of niche and specialist areas, with its relevance in this context being to highlight constructs such as, patterns, interconnectedness and integrative notions covered under areas like: Complex Adpative Systems; System archetypes; Chaos theory and Fractal geometry; Self-regulation; Interconnected systems such as Gaia and the levels of granularity of such systems. Today, the definition of complex systems, as promoted by the Sante Fe Institute (SFI) reads -"the conditions of the universe, which is integrated, and too rich and varied for us to understand in linear, mechanistic ways" (SFI, 1996). Unlike traditional science, which focuses their efforts on "ideal phenomena", complexity studies the real world phenomenon like Turbulence, Non-equilibrium, Self-organisation, and Adaptation, and according to Fritjof Capra (1996), complex systems are

comprised of three key sub-systems (Pattern, Structure, Process), which seem to converge toward the emergent behaviour of biological, technological, social and economic systems (Kauffman, 1993). The elements drawn upon for the prototype in this regard relates to how management and organisational science can be enriched in order to imitate self-regulation of complex systems. Management paradigms, i.e. management theory of the 19th and early 20th century being deterministic, dismiss notions that absolute control is impossible, and that balance or equilibrium is based upon flawed logic perhaps only relevant to mechanical and certain simple or closed systems, and not organisations which are complex systems. The myriad of dynamically interlinked relationships between and within agents of organisational and social systems, cannot be ignored, consequently, the complexity of such landscapes cannot be dealt with in a linear orientation since the interaction between these multitude of systems and their sub-systems give rise to emergent phenomena. Generally emergence is defined as features or qualities that exist only in the higher level or whole, and not found in its constituent sub-systems.

It is often equated with “the whole being greater than the sum of the parts”, implying a bottom-up, as opposed to a top-down communication process.

2.4 Solution Development

The “specifications” articulated in section 2.2 at a high level, and then subsequently refined under section 2.3 to more specific systems elements aiding in the theoretical solution, revealing the magnitude of the task at

hand, especially when a key prototype requirement relates to it being more accessible to laypersons or those having little, or no formal systems knowledge. Despite this difficulty, the need to impart systems concepts and tools to be accessed in an integrated and practical manner through easier vocabulary and a robust architecture for varied user communities provided motivation throughout this longitudinal process.

This section concretises how aspects of systems-based methods and tools have been “absorbed” into the prototype. As highlighted, current systems tools are extremely valuable in terms of problem formulation and solution development, but tend to lack detailed implementation elements and tools. In other words, existing systems tools, models and methodologies provide for sound planning, implying the softer side of interventions, but appear to lack in the back-end, or harder, tangible implementation aspects of interventions. Additionally, it also requires a good understanding of systems science in general, and the varied specific tools, making it inaccesible for the layperson to easily adopt, use and infuse into their daily routines.

The prototype “absorbs” underlying elements, or the “thinking” from the various systems body of methods, simplifies them as far as possible, then use and deploy these in concert, to enrich implementation and integration efforts of interventions. The solution development incorporated the following principles:

2.4.1 A framework as an open, growing architecture

A key development aspect is the quality of continuous improvement, and promoting this capacity within the prototype. This is important from two particular viewpoints, one being desirous to have a practical tapestry of our ever growing systems and related knowledge. The other being able to access such a framework, for practical guidance and possibly even more tools, that provide potential users greater comfort regarding research and development that would ideally support such a potential repository. In practice, the value of continuous improvement is aptly shown by Kaizen (Imai, 1986; Liker, 2006; Tozawa, 1995), referring to activities that continually improve all functions and involves all employees. Importantly, it crosses organisational boundaries as well, meaning that it looks at processes such as supply chain, logistics and extended value chains, which are beyond the organisational boundaries. The extended value chain (EVC) aspects of this body of work can be seen to appreciate the importance of the Kaizen principle whereby agents and agencies outside of the immediate ambit of control of the project or intervention, can often have a large impact upon outcomes. Kaizen sees the human or people aspect as core to it's 5 principles (quality, effort, involvement of all employees, embracing change and communication).

Both of these aspects are integral to the prototype as it touches upon systemic nature of extended value chains, as well as putting a priority upon people issues under the tactical architecture.

A robust framework need not be impinged by the essence of its unique and growing sub-system features (i.e. the various hard and soft systems methodologies), as such the protoype recognises that no two interventions, projects, businesses, social systems are ever alike, they may be similar, but hardly the same. The experience on various projects (planning and execution aspects) suggest a rush to a "stock standard" type of intervention and solution architecture. Gharejdaghi (1999) suggests this observed "success-to-failure" is indicative that we need to "accept that success demand we go back and re-examine the problem space all over again", thus formulating the new "systemic mess" need to be the first activity after success (Gharajedaghi, 1999). This refers to the fact that once successful solutions, tend to be repeatedly implemented in new contexts. Thus to search for a "recipe" or "silver bullet" that can be applied with high levels of confidence seem firmly outside of our grasp. This is partly why the prototype may add value, as it does not purport to be such a "recipe", and instead suggest the prototype as a potential basic building block that allows the increasing knowledge to be subsumed in a manner that is practicably accessible.

Considering, in any given problem or "system-in-focus", be it a project, a small organisation, a large multinational, a public agency or a country, there are a myriad of systems and sub-systems at work at any given moment, for example, biological systems, such as humans, animals; complicated systems, such as supply chain or financial systems; and

simpler systems such as energy networks. The point is that each of these systems and their sub-systems interact in a rich, dynamic manner, which supports the idea that we begin to adopt integrative tools and guides, to deal with the systemicity (multiple-system types). The prototype embrace these uncertain, probabilistic aspects of complex systems, without attempting to derive a "perfect" solution. This is further enhanced by suggesting that each entity (agent or agency), will have its own unique confiuration of the prototype, meaning that each instance have a unique "gloden thread" woven in the fabric of it's overall architecture. As an example, agency A may be very strong in terms of it's tactical architecture; compared to say agency B, which may be more focused upon the strategic architecture, despite operating in the same specialised market. This diverts the common practice of taking what has worked before, and applying into a new context, a tendency noted by Ghareldaghi (1999), who warns of such irrational concepts based upon our mechanistic epistemology so deeply embedded in our socio-cultural texts. His model suggests six types of systemic understanding relating to systems, with distinct support given to Ackoff''s (1997) "interactive design" that fill the gap between reactive and pre-active planning, since it is directed at creating the future. It proposes an organisation's future depends at least as much on what it does between now and then, as on, what is done to it (Ackoff, 2001).

Another interesting concept evident from the practice, relates to the under-estimated value derived from pictures, diagram and maps. Project experiences suggest improvement of both understanding and communicating issues, concepts and aspects of integration, relation and interdependence (relevance diagrams and “rich picture” concepts from soft systems methodology). Project experience seem to support the rich picture concept, since it depicts the primary stakeholders, their interrelationships, and their concerns, into a broad, high-grained view of the problem situation (Monk & Howard, 1998).

2.4.2 Systemic science alliance

The prototype adopts and absorbs key concepts from the broader systems field, e.g., System of Systems Model for its integrative notions; System Dynamics for its problem definition aspects; Chaos Theory and its view on certainty and recursive design; Complexity science and the notion of emergent phenomena; Ashby’s Law of requisite variety; Systems language as a key in itself. The author relies upon the remark by Jackson that argues for greater integration and collaboration between social sciences (gaining knowledge) and operational research (to resolve problems) in order to generate improvements and synergies (Jackson, 2004).

Although there is no single Theory of Complexity, some of the notable contributions come from the likes of Stuart Kauffman and John Holland on complex adaptive systems (CAS), as well as Prigogine, Stengers, Nicolis, Allen, Goodwin, Murray Gell-Mann, to name but a few.

In Prigoginian terms, all systems contain sub-systems, which are continually "fluctuating" and impacting each other in a dynamic interplay. This feature of systems-within-systems and the notion of system-in-focus (SiF) has been captured in the prototype at all levels of resolution. Furthermore, modern organisation theories do not state that there is one best way to organise, but make explicit the space of possibilities that exists for interpreting and designing organisations (Morgan, 1986; Gazendam, 1993).

2.4.3 Systems complimentarity

System Dynamics and Management Cybernetics are shown to be complimentary (Lane & Oliva, 1998), i.e., both rooted in Systems Approach; both have methodologies dealing with complex systems; and both originate from General Systems Theory (GST) and Information Theory. Also it is argued that Management or Organisational cybernetics provide contextual complimentarity to system dynamics, and have been classified as “functionalist systems approaches” (Jackson, 2000). Richardson (1991), threads Management Cybernetics to Cybernetics, whilst System Dynamics threads to the servo-mechanical (economics & engineering) background. Socio-technical systems has bred many models generally directed toward diagnosis and design, such as theory of Management Cybernetics, with VSM being the most encompassing theory (Beer, 1979, 1981, 1985, 1989), that propose a focus upon viability with its unique 5 sub-systems that can be mapped onto organisational structures,

so as to enhance the organisation's ability to function efficiently and remain viable as an entity.

The prototype relies upon the complimentarity of systems methods (planning, design), and attempts to provide support in practical areas such as: accessibility of system tools for laypersons; and implementation integration improvements, both of which are needed in the local practice.

2.4.4 Architecture systemicity and mapping aspects

It can be argued that much performance shortcomings are related to the inability to visualise (mapping systemic consequences) from point of conception throughout planning, and into delivery at project level (Jackson, 2001). In accordance with this theme, the prototype adds value by suggesting an integrative concept to overcome fragmentation. The interwoven webs of social interactions place huge challenges to the stability of our collectives, whether families, small teams, enterprises or global institutions (Capra, 1996; Homer-Dixon, 2001), and thus require us to develop such integrative, systemic understanding and tools.

The interconnected architecture of the prototype, link practical interventions, by providing a "map" of potentialities to improve insights and ensure delivery elements retain a strong connection between both the agency's internation capacity, as well as external perturbations.

2.4.5 Open systems and Requisite variety

In order to relate variety to open system principles, we need to distinguish three types of variety relating to organisational learning (Gazendam, 1993): **Structural variety** - the (qualitative) variety of responses an organisation can produce in reaction to perturbations, and relates to Ashby's law of requisite variety (e.g. assembly of products or the adjustment of colors based on market trends); **Procedural variety** - this refers to different, alternative strategies that can be used to perform tasks and to learn to apply the strategies that fits best. This type of variety is related to the evolution principle (e.g. process innovation); **Substantial variety** - this is the variety at a restructuring level referring to strategies that enable restructuring, which relates to say product or market innovation; changing the culture of an organisation. Variety in general seem to be necessary to develop innovations for organisations to survive in the long run, since the organisation has to shield itself from too much "environmental noise" that can cause distraction (Thompson, 1967). The capacity for entities to build requisite variety or the ability to absorb variety, is however challenging since it requires learning, seeing, and doing things differently, touching upon issues of change. The prototype attempts to incorporate this notion by way of adopting the attenuators and amplifiers for regulating variety in the system and its sub-systems. The model proposition suggests variety absorption capacity be dealt with at all levels of resolution, allowing for greater innovation at each level. Although the proposed intervention tool does not differentiate between the types of variety as explicated above,

and instead promote the building of variety as a whole, by way of effective use of attenuators and amplifiers, located within and between sub-systems. It does not prescribe what the ideal attenuators and amplifiers should be, but suggest more effective utility of existing tools and support such as secretarial and secretariat functions; email; mobile technologies; weekly and monthly meetings; newsletters; training; mentorship; and interest groups as common or often existing mechanisms to enhance variety in general.

A fundamental law of cybernetics is the related Law of Requisite Variety: "the variety of a regulator must equal that of the disturbances whose effect it is to negate" (Ashby 1968). Another formulation by Beer (1995a) is "that control can be obtained only if the variety of the controller (and in this case all parts of the controller) is at least as great as the variety of the situation to be controlled." Beer claims this notion to be poorly understood (Beer, 1995c), which to a large degree had been experienced in all of the projects whereby any form of variety is interpreted as a threat by agents in the public sector. The lack of effective change (the essence of variety) are frequently raised by the local media whereby board members of important state owned enterprises (SOE's) are dominated by a small group of political appointments, with the same agents serving on multiple boards, thereby lowering as opposed to enhancing variety.

Variety as explicated by Hock (1994) refers to as the "second law of the universe: nothing can be made simpler without becoming more complex". Persson, Roland, & Tabellini (1996) and Diermeier & Myerson (1999) have

shown that an appropriate division of power (such as in a compound board), can increase the welfare of all stakeholders. The compound board issue has special relevance to the South African context in terms of the limited transformation of the State Owned Enterprises, which impinge upon the rate of service delivery.

The lessons from the action research also support this notion (see Chapter 5, examples of the lack of experienced resources as a key systemic factor), which in turn results in a few individuals dominating, government departments and related entities. Whatever reasons may exist for this feature in the SA economy, it is far too common and underscore the senior management and political inability to recognise its dire consequences, such as locking out fresh opinion and insights that others may offer, thereby reducing variety and inhibiting innovation. Both from a management and political maturity perspective, critique in general is currently seen as a personal attack as opposed to an opportunity to reflect and improve based upon wider and deeper understanding of whole problems. Additionally, across three key interventions in the departments of Housing, Treasury and Justice, the propensity to adopt only parts of intervention recommendations is another challenge in that only aspects that suits senior management are adopted, often based upon undisclosed motivations that appear to be self serving.

Another insight by Ashby is the impossibility of amplifying regulation. In discussing the capacity of any controller to regulate/manage variables,

Ashby (1968) states: "The Law of Requisite Variety, like the law of Conservation of Energy, absolutely prohibits any direct and simple amplification but it does not prohibit supplementation". In practical terms, it suggests as an example, that one man would not be able to directly load hundreds of heavy containers onto a ship, but the Law of Conservation of Energy does not prohibit him from supplementing his energy by using a crane. Likewise, supplementation of regulation depends upon one regulator being used to regulate many others. Meaning, one man could not efficiently regulate the temperatures in a 100-room hotel (daily weather changes), if he had to adjust the heaters/coolers in each room directly. However, if each room had a thermostat, which sensed changes in temperature, making adjustments accordingly to its sensors, then one man could control the temperature of all rooms. The law of requisite variety explains why it is unlikely for governments to regulate the complexity of society without supplementation. However, lawmakers are not aware of this limitation and continue to introduce more and more prescriptive laws in an effort to introduce greater regulation. The result is more red tape to frustrate business, more cost to tax payers with problematic protection for consumers and investors for whom the laws are intended to protect. This statement is made expressly as the experience of the actions research seem to support this notion, and views supplementation as essential in terms of the regulation of firms, where one law/size does not fit all.

It is by trying to protect the public from all firms in all situations that the law becomes complex.

Instead of prescribing details/temperature for each firm/room, the law need only prescribe the processes ("business rules") by which each firm/room is regulated. Prescription is still needed but it is at a more basic level to ensure that supplementation is provided by each firm to introduce elements of self-regulation, however when contrasting this to the SA landscape, the increasing regulations (e.g., regarding Black Economic Empowerment; Extended Public Works Programme), is a good example of supplementation and variety constraints that are inappropriately matched and managed.

2.4.6 The tacit organisation – local capacity assumptions

It is important to appreciate the notion of the tacit organisation, defining the tacit networks (supporting sub-systems), that make things happen, i.e. the organisational capacity inherently assumed to be in place. This also references the more significant issue defining the support networks that could be used, but are seldom accessed, to create and produce the anticipated and desired outcomes. Upon deeper reflection, this feature is where most linear planning considerations make implicit agency assumptions regarding their internal capacities like: levels of experience; levels of expertise; Resource capacity; Administrative support; Supply chain efficiencies; which are assumed to be in-place, accessible, willing, and immediately available. Such implicit assumptions manifest themselves in higher than expected costs, delays, and missing key milestones/targets. The prototype, by virtue of system-in-focus and sub-systems, aim to

highlight the integrative nature by surfacing the implicit assumptions made regarding capacities of the internal organisation, including extenal, or third-parties and sub-contracted stakeholders. Only in this manner, could the tacit organisation hypothesis ensure that resource are focused upon the task at hand, and are able to relate to each other in terms of producing an autonomous system, with the capacity to create, regulate and produce the task outcomes, irrespectice of intervention type and scale.

This hypothesis seem reasonable, based upon the pratice evidence that reveal the existence of such implicit expectation whereby relevant resources, will relate to each other in such a way that they are able to solve their own operational problems, reduce fragmentation and dependence on unnecessary weakly related resources. These contributions manifest as misaligned outcomes, which incur yet more resource cost when rectification intervention is later required, such as for example additional processes and activities from competent observers and participant to aid in unraveling the “mess”. This is possibly where the prototype may add value in terms of knowledge management (KM), which became an established discipline in 1991. It comprises a range of practice used in an organisation to identify, create, represent, distribute, and enable adoption of insights from experience (Nonaka, 1991). The purpose is to practice knowledge as an agent within an agency whereby both entities are enriched through the sharing process. KM includes a growing list of coursework covering Administration, IT systems, Management, Library and

information sciences (Alavi and Leidner, 1999). At a practice level, KM is seen to reside under organisational units such as Strategy, HR, or IT (Addicott, McGivern and Ferlie, 2006), and is seen as a repository of sorts that agents can access in order to learn, reduce redundancy and share intelligence. This is where the prototype hopes to contribute to the KM field, since a vital part of the intervention is the knowledge repository that remains with the client, post the intervention. It is usually in electronic format, containing useful templates, processes, guides and project related information. These efforts are aimed at reducing risk to client's, such as loss of key staff, or where staff turnover is high, or for common instances where organisations experience consultant/vendor lock-in.

Since KM is also seen as a means for organisations to adapt faster (McAdam and McCreedy, 2000; Thomson and Walsham, 2004), the prototype repository may serve to contribute in this regard. Furthermore, early case studies recognise the importance of KM dimensions in strategy, process, and measurement (Morey, Maybury and Thuraisingham, 2002), with lessons covering people, and the cultural elements that influence behavior. Although a broad range of thoughts on the KM discipline exist, maturing academic debates have increased both practice and theory, such as for example the Techno-centric view that focus upon technology that enables knowledge sharing; Organisational view that focus upon how organisations may be designed in order to enhance knowledge sharing; Ecological view which focus upon interaction between people and the

environment, much like a complex adaptive system having co-evolutionary qualities. Regardless of philosophical underpinnings, core KM elements include People, Processes, and Technology, or Culture, Structure and Technology, depending upon the prevailing perspective (Spender and Scherer, 2007), which are elements the prototype promotes as an integrated level of system granularity under the tactical architecture level of resolution.

2.5 Characteristics of the prototype

The key characteristics of the prototype can be summarised as:

- Drawing upon elements of systemic and systematic models so as to act as a design and delivery support system, creating systems viewpoints in order to understand systemic effects for planned interventions;
- Acknowledge importance of pluralist frameworks, using aspects from hard systems, soft systems, and management methods, so as to promote deeper and wider linkages between pluralist models, capacities, understanding and contributions toward the enhancement of interventions, and attainment of the strategic objectives of the client;
- Architectural notions and integration promoted for a project, programme or organisation in terms of an integrated sub-system architecture that focus upon inherent interdependencies and relationships between and within constituent sub-systems, which are unique to each instance;
- Problem definition improvement by reaffirming the strategic objectives encourages deeper and wider problem statement development

appreciating its enabling context (organisaton), and that of the environment;

- Extended value chain (EVC) insights, more specifically that all agents and agencies acting across the extended value chains have their unique prototype configurations, which may be useful to relate too, since service delivery usually require multiple agencies to ensure attainment of desired outcomes, and having insights as to implicit assumptions made on behalf of these agencies may prove useful in mitigating risk and providing some form of advanced or pre-emptive alerts;
- Promote a cyclically iterative implementation model (Consult, Design, Deliver), which appear to be similar to that of Design Thinking's (Inspiration, Ideation, Implementation);

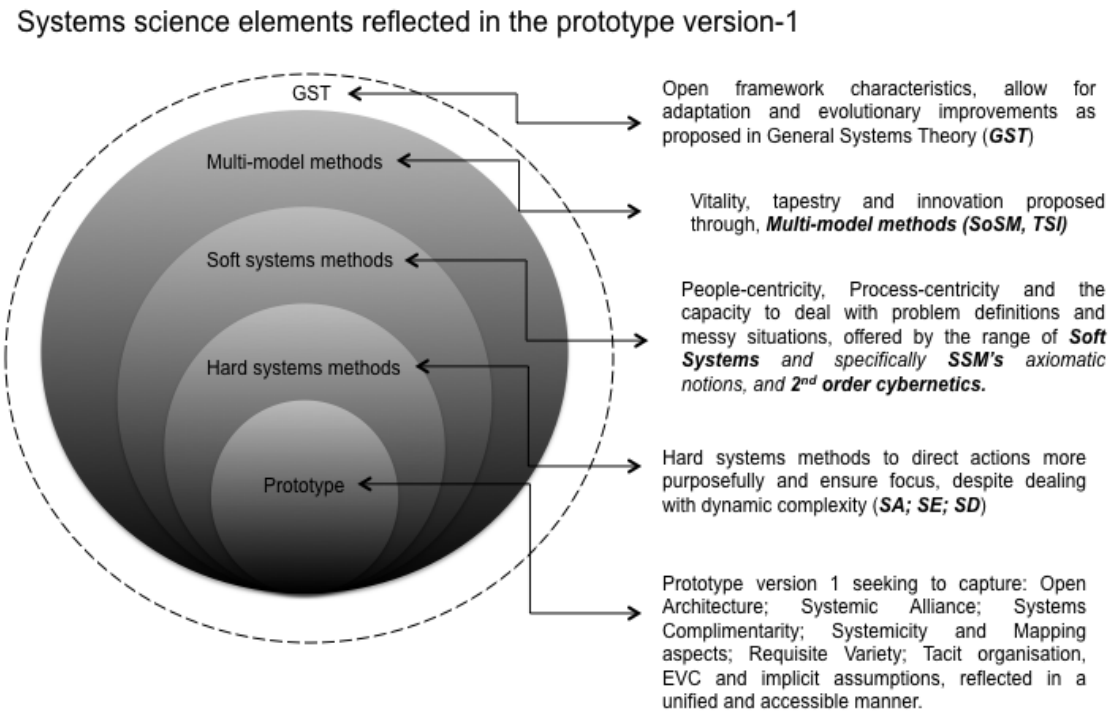


Figure 2.12: Notion of absorption of systems science elements in the prototype

These aspects provided a sound theoretical platform to resolve some of the SA delivery challenges. The application of the prototype in turn, provided for the learning and feedback for improvements of the prototype (prototype-1, prototype -2, prototype-3), over the research period.

CHAPTER 3: THE PROTOTYPE

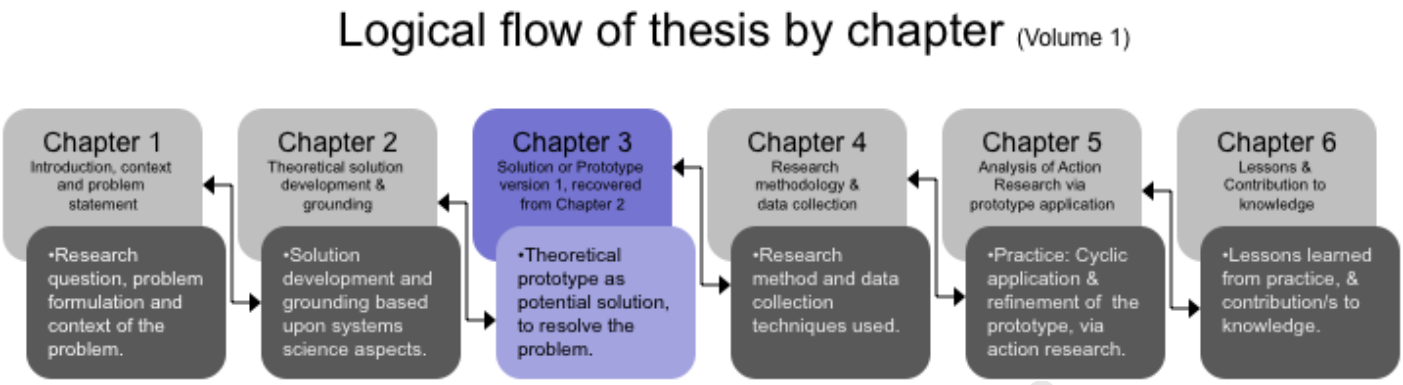
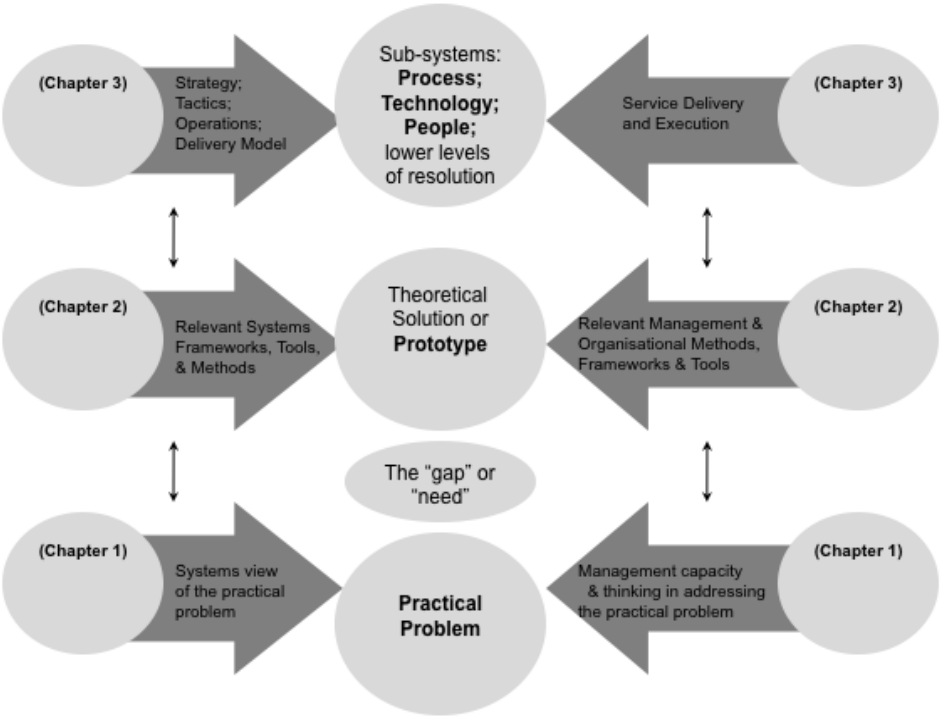


Figure A.3: Repeat of figure A, highlighting chapter specific focus and content

The previous chapter sought to identify the ideal theoretical solution specifications, to deal with the problem identified. This chapter follows through by "building out" the conceptual solution into the prototype (version-1), as its core output. Figure 3.1 below imparts how the design of the prototype, are based upon the problems identified in Chapter 1; the key philosphical and theoretical strands deemed to suit the problem; as well as the theoretical elements informing the "specifications" of the ideal solution from Chapter 2.



Chapter linkages, leading from the **Concern** & Research **Problem** (**Ch.1**); Review of overall Systems and Management issues impacting the problem to understand the "gap" or need to produce the "**specifications**" of the theoretical solution, based upon adopting aspects of specific theory elements (**Ch.2**); Presenting the specifications produced into a potential solution or prototype, to guide interventions (**Ch.3**)

Figure 3.1 Visual perspective of building up to the prototype

Figure 3.1 is a view of how the output of Chapter 3, the "prototype" was arrived at, and sets the tone of this chapter explaining the key theoretical elements identified, and to which extent it has been infused or "absorbed" into the prototype. The extent and nature of the "absorption" is also made clearer, which is a theme that carries over from the previous chapter. The notion of "absorbing" current or accepted families of theories, tools and practices into a multi-model, does not imply taking the elements identified, and simply adding these together. Instead the essence of the aborption relates to the conceptual elements and ideas that appeared relevant to address the question.

These are then presented in a simple integrated manner, using accepted or common naming conventions, so as to make the prototype readily acceptable and understandable by laypersons.

3.1 The prototype logic

The use of relevance diagrams are relied upon to portray the process, intent and reasoning to motivate the prototype. In order to embellish rapid delivery efforts in the local context, it should cover the range of systems thinking, planning, tools and methods discussed in Chapter 2. The ideal prototype is to be an accessible and practical intervention tool, whilst being embedded in systems concepts, which should in theory temper the need of extensive systems knowledge and experience. In this context the basic axiomatic expression of the prototpye is to provide support regarding, how interventions are reviewed, assessed, planned and executed. As noted, the notion of having a perfect solution in itself is thus contingent upon a myriad of factors, suggesting that we may never have a perfect solution, and that we should perhaps strive to have a framework that evolves, as our knowledge increases. The prototype model positions itself in this broad area by virtue of “systemic absorption”, i.e. absorbing aspects of various hard and soft systems investment into its whole architecture. It proposes a number of levels of resolution, accommodating current elements (and possibly future) of systems-based knowledge, adopting elements from a variety of models like systematic aids gleaned from Systems Engineering

and Systems Analysis, including elements from Soft Systems, and broader organisation science into one or more of its core sub-systems.

At the highest level of resolution, it is composed of three core sub-systems, each being supported and constituted by lower-level sub-systems. The primary sub-systems are: ***Strategic Architecture***, incorporating aspects such as thinking, planning, and related future-based settings; ***Tactical Architecture***, that incorporate all forms of enablement, key being People, Process, Technology; ***Operational Architecture***, that focus upon execution elements or delivery of activities and tasks. The objective is to use "simpler" language whilst using aspects of systems and management knowledge into a single tool, presenting it as an intervention aid for managers and practitioners. The naming convention of the sub-systems (strategy, tactics and operations) are not new, but commonly used in practice, presenting ease of understanding from industry in general, whilst capturing original insights of Fayol (1916, 1949), and others. The prototype contextualise interventions, by suggesting that it would in most cases, touch upon and involve the proposed ***strategic architecture*** (in order to understanding the thinking, planning and objectives of the intervention in context of the overall organisational planning); the ***tactical architecture*** (in order to relate to the organisational capacity regarding its people, its processes, and its supporting technologies); the ***operational architecture*** (in order to relate to how agents within client domains act and execute duties).

All 3 sub-systems of the prototype have a dynamic and pervasive influence upon interventions, expected outcomes, as well as the organisation wherein which the project is lodged, and may be seen as a rough-grained configuration of the organisation, providing a map of potential challenges that the intervention will encounter. The proposition is not to argue the uniqueness of sub-systems, but to provide a simplified integrated perspective of the population of constraints likely to impact the intervention. In practice, as an example, it highlighted potential intervention conflicts likely to arise from at least one, or all three sub-systems or their lower levels of resolution (e.g. procurement delays; disconnection between strategies and operations). The latter being more a soft systems issue, is exceeding prevalent in practice, meaning that often great investment goes into planning and discussing matters (pre-occupation in the strategic architecture), but are lost or unconnected to the operations of the organisation. Variations of these in practice are many, and detailed in chapter 5. The matrix below puts this view into perspective, suggesting systems models and techniques, need not compete for space, mimicking integration efforts by Jackson (2001); Checkland and Scholes (1990), at a practical level.

Potential pluralist fusion of elements from systems methods & tools into the prototype

Prototype (BAT) sub-systems	Systems Tool/Model/Method relevant to sub-system	Purpose, Utility, Relevance
Strategic Architecture (Sa)	Interactive Planning; Soft Operational research; Viable Systems Modeling; Systems Dynamics; Soft Systems Methodology; etc.	Planning; Problem definition; Integration elements.
Tactical Architecture (Ta)	Systems Engineering; Information Management; Socio-technical systems thinking; Maslow's Hierarchy of needs; Process Engineering; etc.	Capacity constraints; Core enablers; Co-ordination elements.
Operational Architecture (Oa)	Project Management Body of Knowledge (PMBOK); Systems Analysis; Critical Systems Heuristics; etc.	Implementation; What must be done; By when it must be done; & Quality assurance elements.

Figure 3.2: Matrix highlighting the prototype's absorption proposition by sub-system, linked to system tool/s & the overall utility linked to each sub-system

Figure 3.2 reveal the various systems-based tools, theories and models that may potentially reside under one or more of the chosen architectures of the prototype, but does not purport to include these specifically, other than "absorbing" aspects or elements from these areas, to populate the prototype. This strategy implies the prototype to be a pluralist tool, comprised of traditional strategic management methods (strategic architecture); whilst using elements of hard system models such as Systems Analysis under the process architecture and Project Management body of knowledge under the operational architecture; notions of Soft Systems elements are used by ensuring the human element is strongly integrated as a sub-system under the tactical architecture, whilst proposing that all the sub-systems are highly interconnected and dynamic in nature.

Imporantly, the prototype contain systematic and systemic methods, which may be potentially enriched via greater systemic absorption as indicated in figure 3.2, as part of future research.

The potential for improvement is seen as an important insight since it allows the framework to grow and unfold, as our knowledge of sub-system content increases. This may be criticised as being unnecessarily ambitious, due to the sheer volume of systems-type research to date, as well as the difficulty of accepting an evolutionary-type framework proposition in itself. As a student, this was important for me, meaning the ability to know what types of systems methods were available; where they come from; how they work; what they do; and if it fits into some “whole” set of improvement mechanism? Furthermore, the practicality and accesibility of systems tools is a challenge for most laypersons, which require attention if aspects of such important works are to be made common practice. With due recognition to my sponsor and examiners, this was noted as being risky and trying to do too much. Supporting their viewpoints relate to issues of demarcation, competittive tensions between schools of thoughts, and different model assumptions. However the extended longitudinal nature of this work, provided for an opportune window, whilst the very nature of scientific discovery is based upon pushing boundaries of enquiry and discovery. Whether such efforts leave the researcher “embarassed” is irrelevant, since even in failure there is learning.

This potentiality is important and could be likened to how 2nd Order cybernetics have enhanced cybernetics, meaning that the prototype may be a useful and practical tool that could absorb much more current and future system theories, tools and models. The current version may be mostly systematic as opposed to being purely systemic, as it contain traditional strategic management elements; hard system elements; and only part soft systems. However, the manner in which the multi-models are proposed to operate and dynamically impact each other in terms of the sub-system architecture does provide for some practical systemic perspective, and an improved notion of integration. Importantly, the nature of wicked problems suggest that social problems crosses all sorts of boundaries (specialist areas, vertical segments, business units) due to the very transversal nature of our socio-economic contexts. Our problems and challenges in the real world, are thus embedded in a combination of simple, complex, complex-adaptive system typologies.

In general the body of systems theory deals with these, in either a Hard systems strand; or Soft-systems strand, or a Pluralist approach, all of which are reflected in the prototype to varying degrees. Figure 3.2 below depicts this view, and highlights the “gap” in the world of practice (real world), and the “gap” in the world of theory.

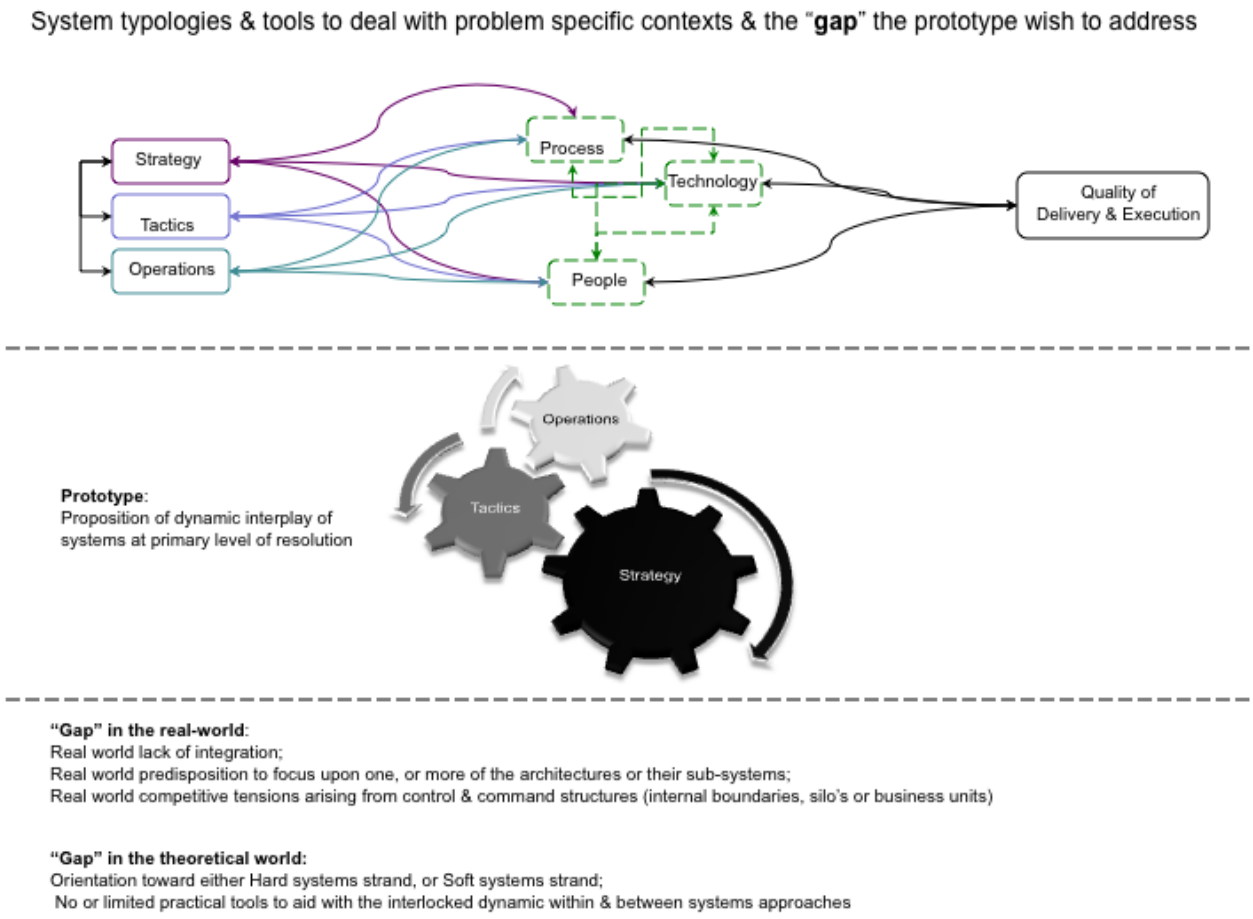


Figure 3.3: Interconnected sub-systems of the prototype adressing the "gap" or need.

Taking this to a pratical level, it suggests social systems to be constructs that contain a multitude of system types (simple systems, like an electrical circuit; complex systems, like energy grids; complex adpative systems, like humans, animals, and the ecosystem), as well as a multitude of system contexts, and a multitude of theories and tools to better deal with problems resulting from these enmeshed and dynamic system types and contexts. As noted in Chapters 1 and 2, the "gap" relates to having a practical systems based tool, able to improve our understanding of our social

problems and their solutions, from conception to implementation. Figure 3.3 above notes the gap to be defined as: Real World – comprising lack of integration; Competitive tensions via structural aspects between prototype sub-systems; Leadership divergence or preference toward one or more of the primary levels of resolution. Theoretical World – Preference to a Hard or Soft systems methods; Competitive tensions regarding multi-model assumptions; No real practical tool available to laypersons. As noted, infusing all aspects of all the models depicted into the detailed sub-system architecture of the prototype, is well beyond this body of work, as its sheer volume would require a study in itself. However, the difficulty of such a task should not deter its pursuance, and based upon this thinking, the prototype may be seen as a first step toward greater synthesis, to support interventions from concept to delivery. The application feedback and conclusions suggest an overall positive effect in this regard, whilst acknowledging the difficulty of trying to make systems tools more accesible. The positive results underscores integration and interrelatedness to support improved problem definition and provide “map & territory” support, implying a sense of understanding the “system-in-focus” (where you are in the intervention), despite the dynamic and complex relationships.

Fleshing out the primary level of resolution of the proposed model reveal its sub-system architecture to be a function of: the Strategic Architecture (**Sa**) - dealing with issues of planning and future based aspects, adopting standard strategic planning as vision, mission, strategic objectives, goals, and milestones as key sub-systems at the next level of resolution; the Tactical Architecture (**Ta**) – dealing with all the possible enablers, more specifically, process, people and technology as its supporting sub-systems at the next level of resolution; and the Operational Architecture (Oa) – which comprises the manner in which duties and activities are executed. Together these systems and their respective sub-systems dynamically interact in unique ways. This proposition yields the primary axiom: "**Prototype=f(Sa x Ta x Oa)".** These three sub-architectures present the business architecture tool, at the highest level of resolution, as conveyed in the nested systems Figure 3.4 below.

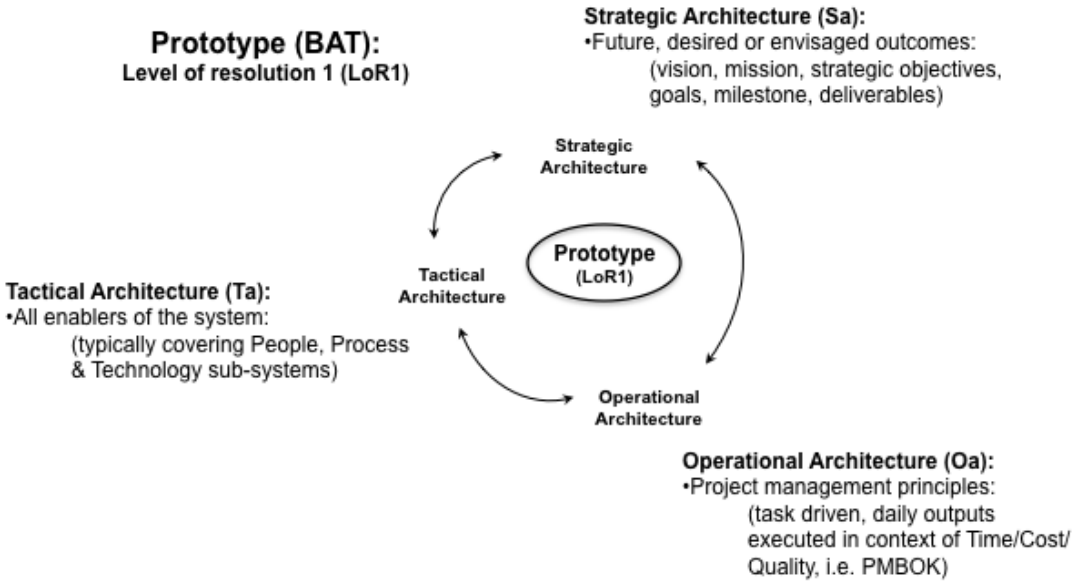


Figure 3.4:Prototype (Business architecture tool), highest level of resolution.

The highest level of resolution promotes a multi-lateral dynamic interplay between the strategic, tactical, and operational architectures, as well as their respective sub-systems. This provide a sense of the dynamic emergent organisational phenomenon known to exist, and importantly introduces the notion that the configuration of how these architectures are setup, arranged, managed and structured are unique to each entity or agency. The multi-lateral connection between strategy, tactics and operations coveyed in figure 3.3, are reformulated to highlight that: thinking and planning (various forms of future based potentialities), are inherently part of strategy, which in turn relate to soft systems. Various forms of thinking usually preceeds any form of action, all forms of action in turn, are enabled through one, or a combination of means (typically being a person, a process, or technology). The nature of the action is contingent upon how actions (meaning routine duties like activities and tasks), are dealt with, or how an agent deploys time across the period of activity, impacting upon cost, and quality functions, which are typical hard systems aspects (PMBOK). It is this multi-lateral dynamic which escapes the mechanical perspective.

The axiomatic principle, is offered as the fundamental inter-locked level of resolution, applicable to any social system, be it an organisation, a programme, a project or an intervention. As noted, the naming conventions have been selected based purely upon its ease of reference and understanding by agents having little or no systems knowledge, thus

relying upon what is broadly understood and accepted in organisations, covering problem definition and planning via the Strategic Architecture; whilst it promotes optimisation of the key enablers in the Tactical Architecture; with the Operational Architecture fleshing-out details how agents execute activities (typically adopting a project management viewpoint in dealing with quality, time and cost management). The prototype can be seen as an interdependent and interrelated system-based tool, able to suit various conditions (e.g. a street vendor's technology may be, using his truck to collect stock in the morning, whereas a corporate may view its technology architecture to be its information communications networks). Typically the prototype cascades each architecture into increasingly lower levels of resolution, revealing their respective supporting sub-systems. The figure below takes the Strategic architecture and reduces it to its supporting and interrelated sub-systems.

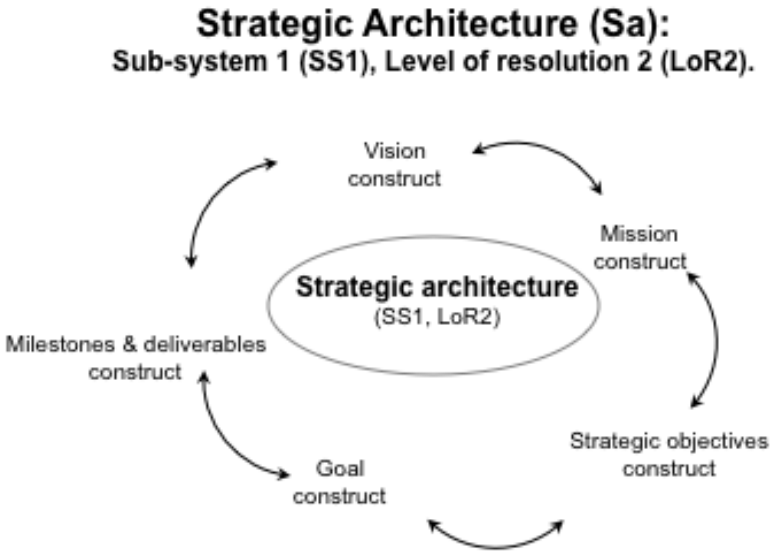


Figure 3.5: Strategic architecture, 2nd level of resolution.

Figure 3.5 reveal typical sub-systems comprising the Strategic architecture, highlighting the interconnectedness of the sub-systems that have a dynamic impact between sub-systems and other levels of resolution contained in the whole, replicating emergent qualities at higher levels of resolution. The current content of sub-systems under the strategic architecture, uses common elements of strategic planning, that need to be clearly aligned to the envisaged outcomes of the plan, be it a project or an entire organisation, speaking directly to the importance of "formulating the problem" (Ackoff, 2001). The problem statement is further systemically expanded by mapping it against the other core sub-systems of the model, such as for example the processes and people sub-systems contained in the tactical architecture, invariably impacted by the planning that occurs at the strategic architecture level of resolution, which underscores the systemic and systematic nature of the prototype.

Due to the transversal nature of wicked problems, interventions should ideally consider the dynamicism of the sub-systems, when formulating solutions. In terms of the practice, interventions seem to touch the Tactical Architecture aspects in a much more direct manner, perhaps because it is the most tangible architecture (Process, People and Technology). The unique manner how these enablers are used, applied and arranged, impacts the envisaged outcomes of interventions, alluding to the dynamicism in the architecture of all organisations. The diagram below depicts the Tactical architecture, sub-system, at the 2nd level of resolution.

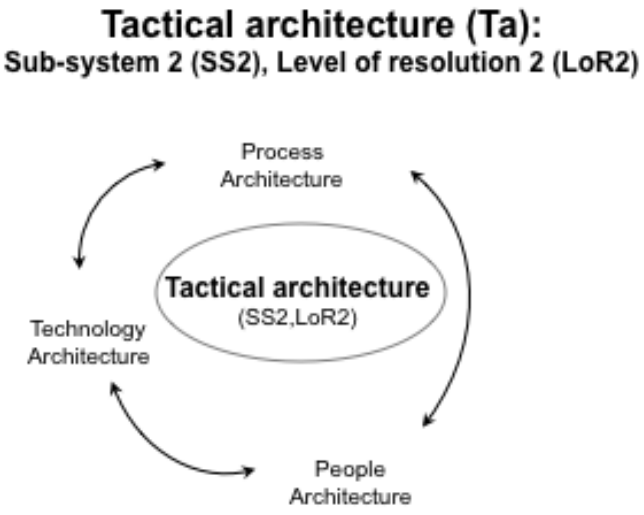


Figure 3.6: Tactical architecture, 2nd level of resolution.

To create a robust solution, it is vital to recognise how these sub-systems operate, and how it can both, add value and impinge upon interventions, touching upon the notion of continuously "interacting sets of problems" (Ackoff, 2001). Organisational enablers are usually seen as the focal point for any intervention as it represent the enablers to be relied upon in obtaining the desired outcomes. The choice of using Process, People and Technological sub-systems is also based upon commonly accepted convention and understanding that these three elements form the population of enablement in an enterprise, irrespective of its size or nature. A common flaw at this level of granularity is that often, one sub-system is deemed more important than another (e.g. say technology promoted by some as more important than say people competencies).

Granted, in some situations, one or more of the Architecture sub-systems may play a dominant role, however, the principle is to seek a uniquely optimal mix of the three enablers for each intervention. Considering interventions or projects are unique, suggest that the ratio of the enablers cannot be imitated or copied exactly, which mitigates against the "success-to-failure" paradigm (Gharajedaghi, 1999), whereby past succesful solutions are replicated although conditions are hardly the same. The third key sub-system is that of the Operational architecture, also appearing at the 2nd level of resolution.

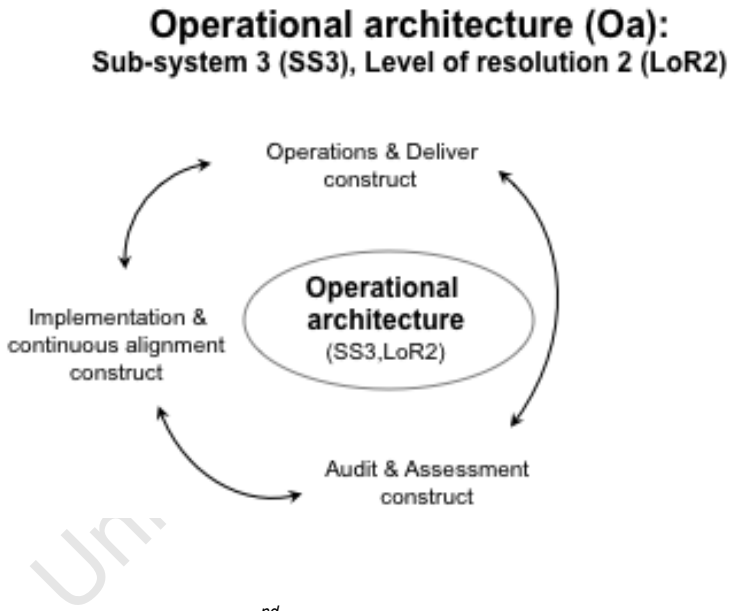


Figure 3.7: Operational architecture, 2nd level of resolution.

The Operational architecture concerns itself with greater detail regarding the task-driven or process-driven daily activities that must be executed by all agents within the broader organisational system. This sub-system adopts known hard systems concepts of project management and the

systematic management of time, quality and cost structures in contributing to the broader multiple tasks, agents are expected to perform.

This is essentially how agents apply project management principles across daily tasks. Fusing the three architectures forms the higher-level axiom (see expanded relevance diagram below).

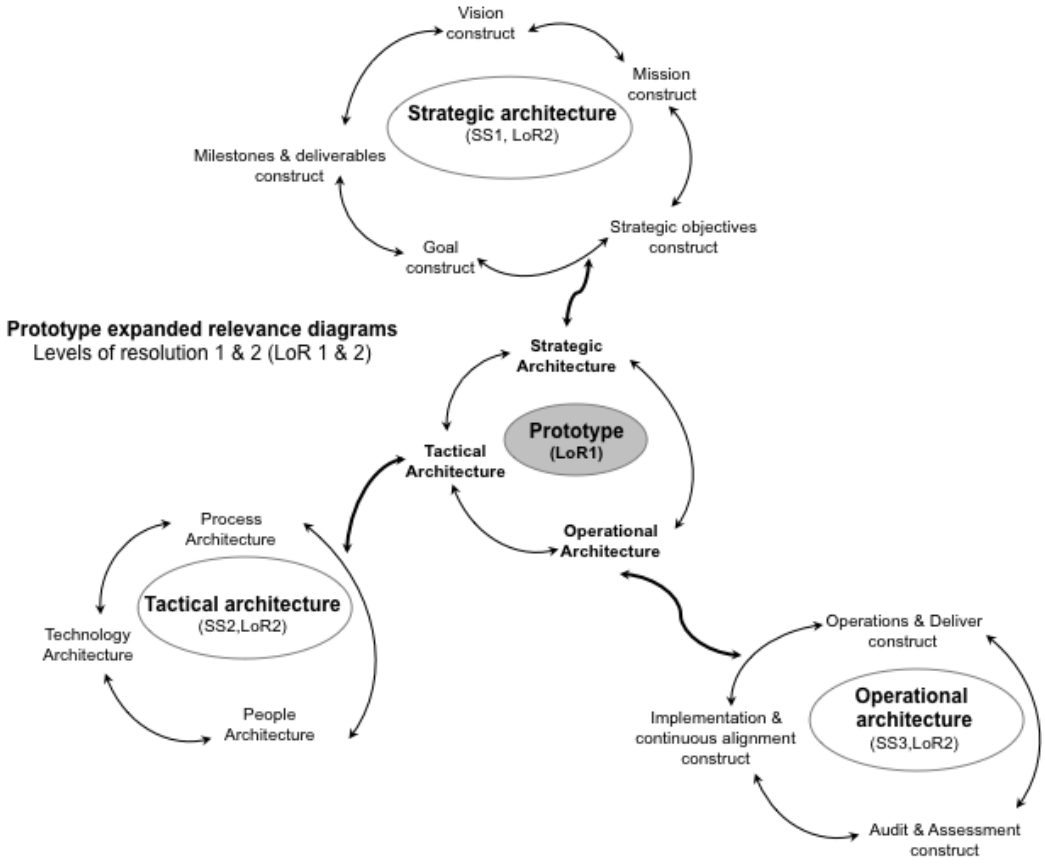


Figure 3.8: Expanded levels of resolution 1 & 2 of prototype (named BAT).

It is this interconnected architecture that constitutes the prototype, incorporating and integrating supporting sub-systems, in a design reflecting elements of emergence, self-similarity, nested systems, and system-in-focus. The diagram below takes the relevance diagram (Figure 3.8), to yield the more refined view below.

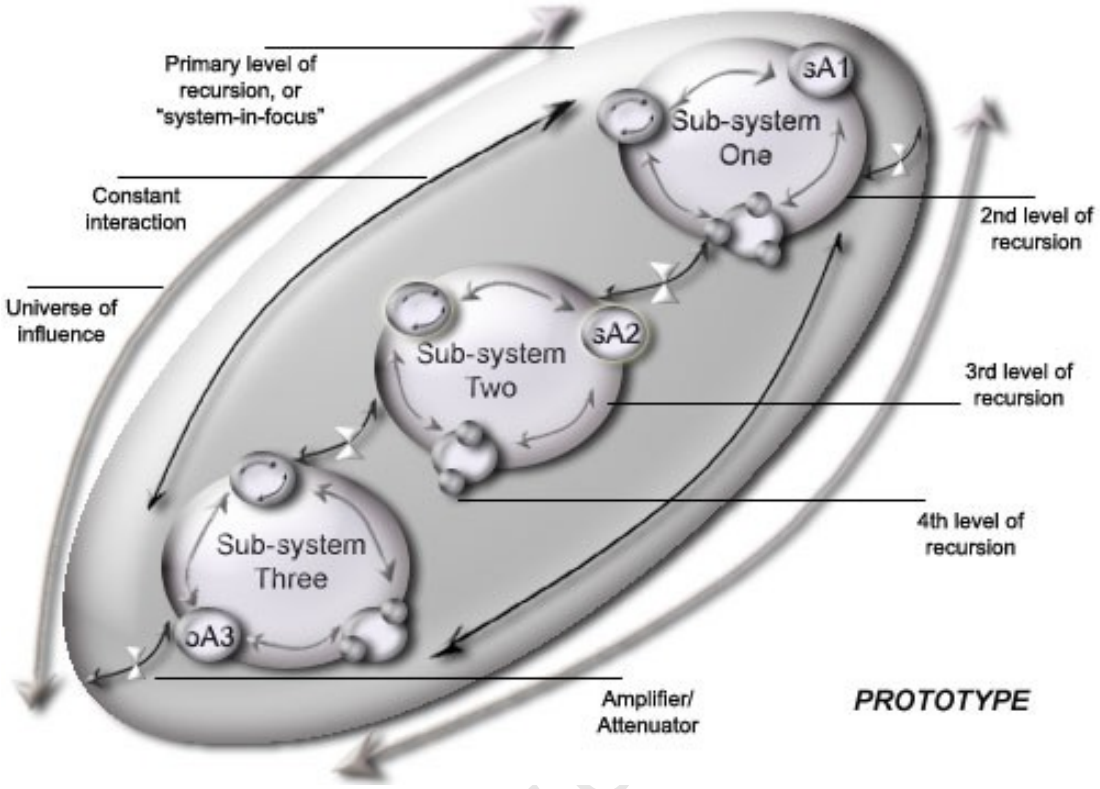


Figure 3.9: Prototype as depicted in the beta version software

Figure 3.9 depict the concept of systems within systems, and that of "system-in-focus" (SiF), implying an application potential to a complex entity such as an organisation, or part thereof, or a project undertaken by an organisation, or a singular activity. The interaction of the sub-systems at lower levels of resolution, provide for the emergent qualities at higher levels of granularity, such as for example, the technological enablement sub-system and the people or human sub-system, which when combined yields the emergent phenomena resident in the tactical architecture, providing for greater capacity to visualise activities in terms of the non-linear impact they may have upon the overall system.

Another feature of the model is that of attenuators and amplifiers, concepts from Cybernetics. In the model it is suggested to help manage the information and flow of data (environmental noise), the absence of which may result in agents being distracted by peripheral concerns as opposed to key ones, (e.g. agents may become overly concerned with say, "technological enablement", as it may promise seemingly greater efficiencies, when compared to say investing in people or processes, forgetting that the core issue is efficiency, meaning harmonisation and integration, not mere automation). In Cybernetics, attenuators can be used to reduce the environmental "noise", by focusing upon most immediate matters of concern. Amplifiers and attenuators do not necessarily have to be elaborately designed mechanisms, in fact many of these are already in place in organisations, such as for example, secretarial support (for more effective administration and scheduling); email (for blocking spam and obtaining updates as opposed to having to attend time consuming meetings to obtain same); mobile phones (for its easy access and pervasive adoption as an essential communication technology); project teams (to focus their outputs upon execution excellence); and the sales team (for more precise and focused marketing and orders). The other important aspect of the model relates to all the arrows (large ones and small ones connected to sub-systems), indicating constant exchange of information or data, providing the dynamic bi-lateral feedback and learning necessary in complex systems. All of these elements support the prototype

"architecture", so as to provide integrated project delivery, from idea stage, to planning and implementation.

Open systems (von Bertalanffy,1950) and cybernetic traditions (Ashby, 1964; Wiener, 1961), promote notions of variety and self regulation, which are realised in the prototype through its levels of resolution, allowing its potential application to various social systems (Beer, 1985; Emery & Trist, 1965; Kats & Khan, 1978). It also provides a visual interconnectedness in mapping the problem statement, by highlighting the potential sub-systems the intervention will encounter, a pre-emptive capacity to stimulate creativity, which are pronounced when linking the proposed intervention outcomes, to the organisational thinking, its current enablement, and its operational mode.

The strategic architecture of the prototype provide a practical integrated view of the problem at hand, by verifying how and where the intervention ideals connect to the organisational policies, objectives and its vision. This compels planning aspects to be related to specific outcome areas, business units, or focal points, creating value to planning by revealing over-estimated institutional capacity assumptions within agencies. The prototype's notion of nested architectural sub-systems, are useful in terms of problem definition, integration within and between sub-systems, a key characteristic to enhance and integrate the conception, design and delivery

of interventions (SE and SA aspects). In this respect the prototype in practice provided gains by ensuring the desired intervention outcomes are understood, planned and executed in context of the organisational sub-systems currently in place.

Another hard systems feature of the prototype, is it's implementation method that adopt System Dynamic (SD) elements in trying to integrate and reconcile the problem statement, the solution, and the implementation outcomes. Additionally, systematic process analysis and design are also contained under the tactical architecture sub-system (which promotes the systemic fusion of process, people and technology); as well as the PMBOK systematic activity implementation, under the operational architecture, both hard system concepts. This underscore multi-model notions of the prototype, to gain improved integration across its sub-system collective. Integration of process, people and technology is supported by Socio-Technical Systems (Herbst, 1974), which promote optimisation between technical and social sub-systems. The notion of system components being optimally integrated, reflect System Dynamics, from Forrester (Dash, 1994; Flood and Jackson, 1991a), covering Control theory, and Engineering Management, with a view to rectify and improve the mechanistic view of management tendencies. This is exactly what the local experience has shown in terms of the development of badly constructed problems statements, and wicked problems.

Soft Systems Methodology, derived from Systems Engineering (Checkland, 1981), proposes continuous cyclical learning, be it for an individual, a group, or an organisation (Checkland,1995). SSM perceives any situation as a product of historical events, which usually contain "would-be improvers" and use self-regulatory aspects to create improvement in a problem situation (Checkland and Scholes, 1990).

The self-regulatory elements and learning inherent in the iterative deployment technique of the prototype, aims to develop skills of planning and integration for practical situations. The prototype embraces the uncertain, probabilistic aspects of complex systems, where "perfect" solutions, or exactly replicable solutions as irrational concepts borne out of mechanical epistemology (Ghareldaghi, 1999). Ackoff warns of planning and execution, which are linear in nature, and notes two common types of planning (reactive and pre-active), suggesting a third, "Interactive" planning (Ackoff, 1997, 2001). Planning, using the prototype is enriched in a similar manner by virtue of the strategic architecture being integrated to the tactical architecture, and the operational architecture.

The architectural sub-systems bringing forth their respective value to yield a robust, yet flexible solution tool. Powers of flexibility, meaning the process of change that interventions invariably experience (viability of plans and implementation models must be to adapt, based upon the receipt of new stimuli or proejct feedback). The simple robustness of design, provide the tool it practicality and ability to deal with any size

project or organisation since all agencies inherently require the 3 architectures, to varying degrees. This supports the proposition of being "solution-centric", and that no solution is ever the same, mitigating the notion of "success-to-failure" highlighted by Gharajedaghi (1999).

3.2 Model prototype (version -1)

This section provide a summary of the actual prototype, with the detailed version being located in Appendix D, Volume 2. The following diagrams represent the prototype, called the Business Architecture Tool (BAT) in a schematic fashion, by representing the highest level of resolution, including their respective underlying supporting sub-systems. These iterations are referred to as lower levels of resolution, each have relevant detail within them, creating the granular nature of the model. The supporting figures used, was taken from the prototype software, which is a simple software tool developed by the firm (researcher) in order to help with intervention implementations. It serves as a combination of a project management tool that allows clients to measure the intervention performance, and importantly act as a repository for project related documents, with aids like templates, that remains behind within the client environment, post the intervention. It ensure clients have access to methods and tools and serve as a knowledge-base.

The software-type diagrams may appear “glossy”, however the exposure to this type of diagram are limited, and hopes to impart the imagery of systems within systems and the notion of system-in-focus.

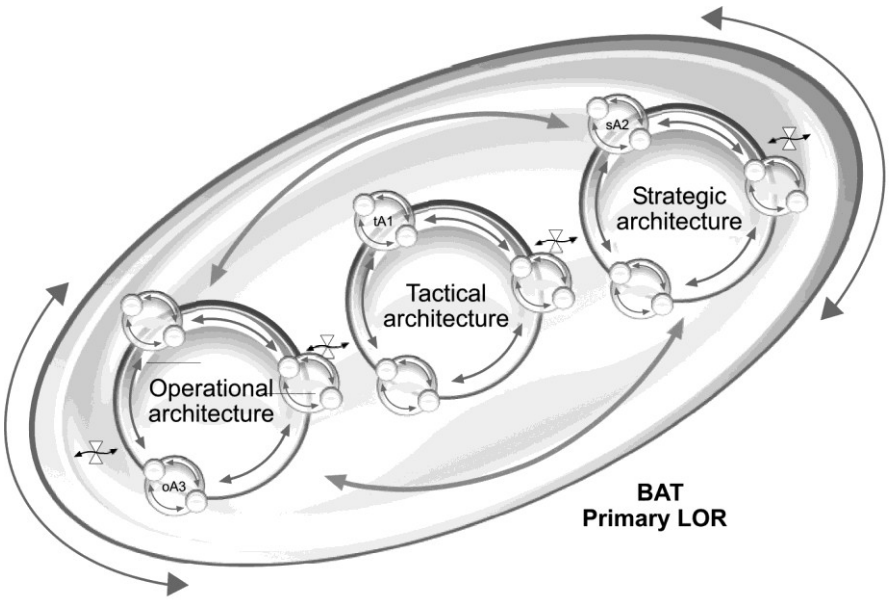


Figure 3.10: BAT, Primary Level of Resolution (LoR) taken from the beta software

The nested systems design reappear throughout the tool, as it delves into deeper and lower-levels of resolution, introducing ease of navigation at all levels of resolution, providing consistency and robustness. The highest level of resolution comprises: Strategic Architecture, Tactical Architecture, and Operational Architecture, which leads to the adoption of the axiomatic function - “***BAT = f(SA x TA x OA)”.*** The model use these three primary systems, and their respective, multiple sub-systems, as an integrated tool. Understanding the systems and sub-systems intimately, and indeed how they affect the efficacy of dynamic entities or viable systems like organisations, are aimed to be better understood and mapped when undertaking interventions. From a systems viewpoint, it does not imply that an optimal BAT requires all three sub-architectures to be “perfectly

resourced", nor harmonious. This is hardly the case, irrespective of having the best resources across the architecture, meaning, to have well conceived plans and strategies (strategic architecture), without decent enablers (tactical architecture) would not be efficient. Neither would the best software, people and processes (tactical architecture) ensure success, without having basic support from the other architectures in place. It is however how organisations mobilise these in concert that produce their quality of performance. The diagram below depicts the prototype levels of granularity 1 and 2, as an example.

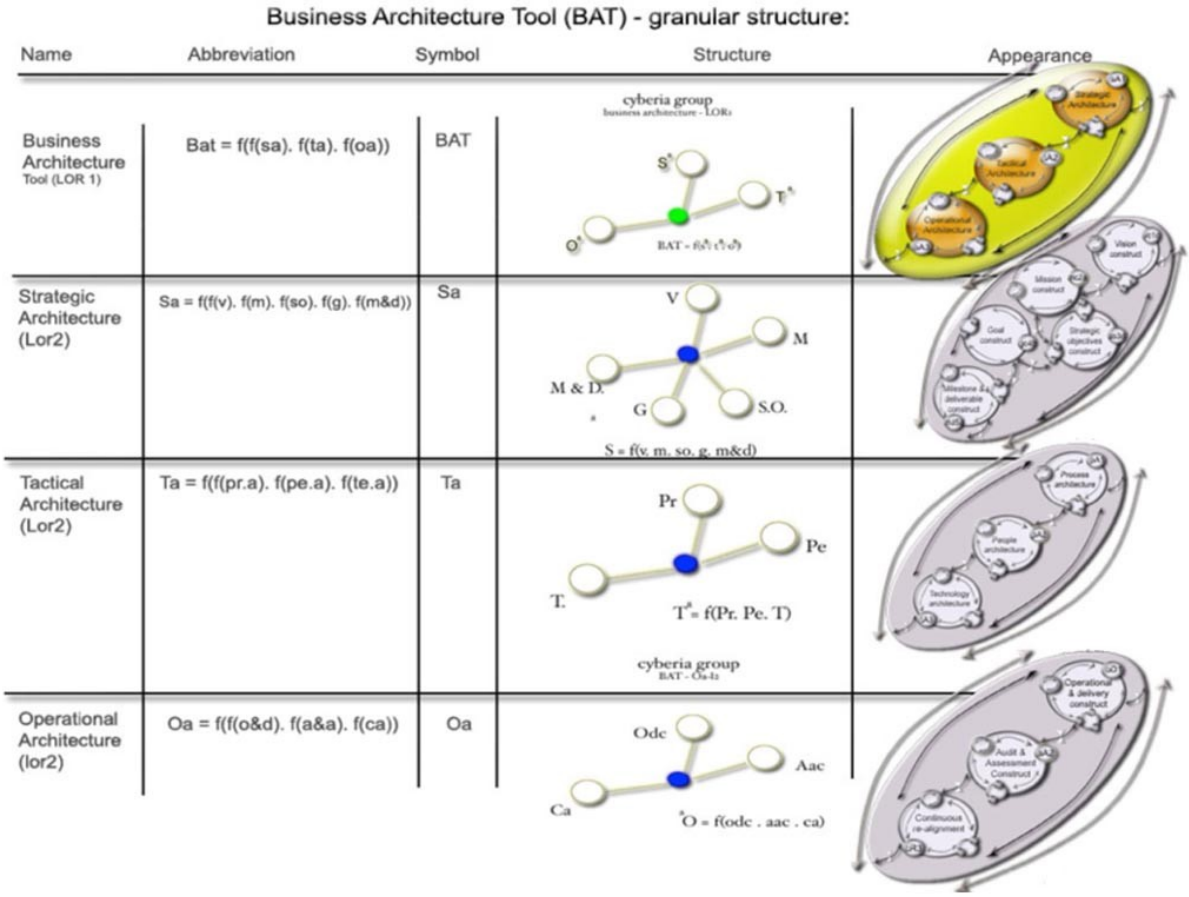


Figure 3.11: Matrix view of prototype (BAT) structure from the beta-software

The tool attempts to be a reminder that attention to only one systemic sub-system is hardly effective, and that being able to visualise and observe the interdependencies between the larger system, is the only manner to build sustainable and improved outcomes.

3.2.1 Strategic architecture

The strategic architecture is the first sub-system and cascades into its core sub-systems, leading to a composition of typically - the Vision construct, the Mission construct, and the Strategic objective construct, Goal construct, Milestone and deliverable construct. Each of which, in turn, is supported by their respective sub-components, at the next or lower level of resolution. Whilst the system-in-focus is still the organisation, the sub-systems clearly display and support the notion of integrated relationships across the architecture. Taking the model to a lower level of resolution, the vision construct would typically contain, as its key supporting processes or sub-systems: Analysis of the future landscape; Analysis of the capacity and human capital; and the prevailing management value system. These three sub-systems are vital support mechanisms for the “parent” or preceding, higher level of resolution (vision construct).

Similarly, will each of the other constructs have a number of supporting levels of resolution, giving its predecessor credibility and impetus. This aspect attempts to elicit the concept of emergence, into the model.

The purpose is to have all activities in the organisation aligned toward meeting its overall objective. The model allow stakeholders to see how and where they fit into the “broader scheme of the operations” thereby tapping into their collectively orchestrated efforts (see Figure 3.12 below).

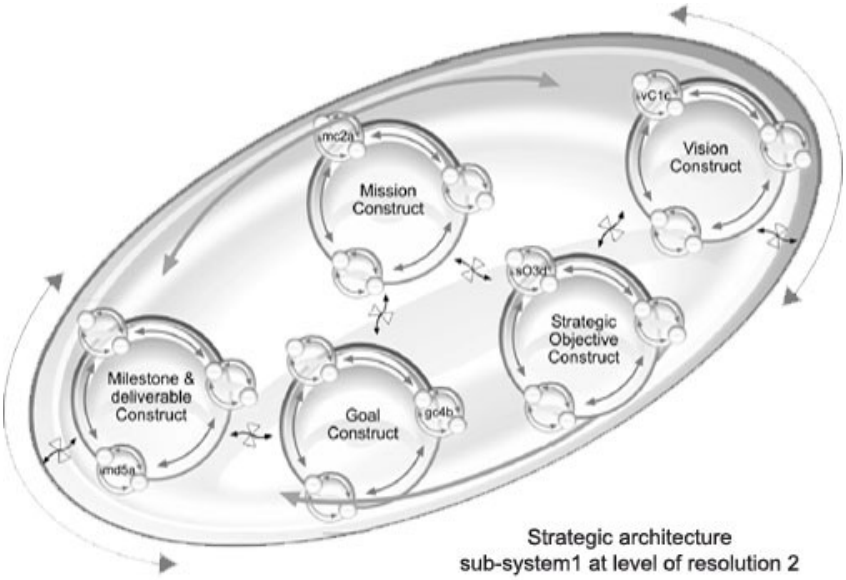


Figure 3.12: Strategic Architecture taken from the BAT software

The diagram above highlights the strategic architecture as a function of the vision, the mission, the strategic objectives, the goals, the milestones and deliverables, yielding the model notation: “Sa = f (vc x mc x soc x gc x mdc)”.

Each of these supporting components are unpacked, as part of the lower levels of resolution of the model, for example, the vision and mission constructs (see Appendix D, Volume 2 for detail of sub-systems).

3.2.2 Tactical architecture

The tactical architecture is the second of the 3 sub-system architectures appearing at level of resolution 2, and concerns itself with the enablers of Process architecture; People architecture and Technology architecture. These three supporting sub-systems are each levels of resolution contained within the tactical architecture (sub-system 2, level of resolution 2). A robust tactical architecture can only be such if it contains the basic elements of a defined process; the people doing the work; and the supporting technological enablement. The combination of how these three sub-systems are employed may depend upon the maturity of the industry, expertise of the people, and a number of other issues specific to the organisation and/or the industry. The Tactical architecture can thus be described as being a function of Process architecture, People architecture and Technology architecture, and may be depicted as: “Ta = f{(Pra) x (Pea) x (Ta)}” depicted in figure 3.13.

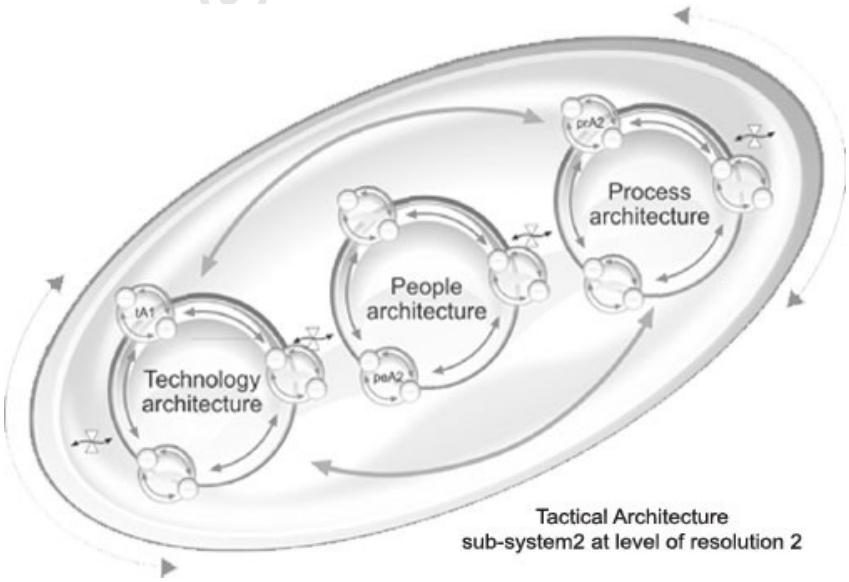


Figure 3.13: Tactical Architecture taken from the BAT software.

The combination of organisational enablers of Process architecture; People architecture and Technology architecture", are not new and explicitly used due to its pervasive adoption as being primary enablers of organisations. In other words, in order to perform any service or produce any product, it would usually require as a minimum, these three aspects; Process is needed in order to relate to how things should be done; People are usually required, since even in our most automated production lines, the reliance upon a person can hardly be ruled out; Technology is similarly needed, which need not imply high-end software and hardware, but rather any form of mechanisation or automation used in the overall productive process. The adoption of technology is pervasive and progressive, whereby most large IT systems already contain built-in automated processes. This may be seen as good or bad, depending upon the perspective, for example technology can automate complex and repetitive processes quite easily, but it does not mean that it is more efficient, although such systems are sold on the back of similar promises. In 1990, a professor at MIT noted in his Harvard Business Review article (Hammer, 1990), that the actual challenge for managers are to identify and eradicate non-value adding activities, as opposed to automating them. He notes that non-value add work is not being removed, only accelerated through information technology applications. This still holds true today, and is also why the caution is made that it is merely one of the three core enablers. Adding to management challenges are creative ways software organisations position their products in the minds of buyers, where typically

in the 1990's, the incorporation of work flow systems was hailed as a process efficiency tool, which is similar to software vendors (e.g. SAP, Oracle selling enterprise resource planning (ERP) as tools of process improvement, innovation and efficiency. The key point is, to implement any idea, strategy or future based plan, the population of elements or tools needed (excluding raw or input materials), invariably would be covered by the three enablers proposed under the tactical architecture.

The constant interaction between the tactical architecture sub-systems, and the subsequent adjustments we make result in the dynamic operational impact. It is common to implement new software solutions with the aim of introducing efficiencies, but obtain results that are not reflective of the intent of the decision.

BAT promotes awareness that decisions, impact the various sub-systems, all of which have a multiplier ripple effect throughout the system. As an example, deciding on say software, we must weigh the impact it has across the People and Process architectures, if we are to maximise such investment, since they represent the basic enablers or instruments of value creation, as we understand it today.

Little attention is given to these sub-systems in terms of being an integrated set of components (tactical architecture), despite it being the execution foundation of all organisational directives. Most senior managers

still view these components as separate and often tend to give only one of the three any real attention. Consider as an example, senior managers which have a bias toward say technology. Technology will, in his/her view be the primary provider of value in terms of meeting a mandate, be it a financial, a procurement, an asset management, or supply chain system. The "built-in" bias will naturally push them toward getting the best technology, in order to extract efficiencies from the automation. There is nothing wrong with this concept since technological enablement is supposed to enhance the business. However, this position is usually taken at the expense of process and people issues, often resulting in "IT" being blamed for the eventual non-delivery and failure of technology implementation projects. The heart of the matter is that technology has two, direct enabler inter-dependencies, one being the interaction of the technology with the human (people) element involved. The other, being the organisational specific flow of work, in its routine of performing its functions (process). These three enablers operating in concert yield an efficient tactical architecture.

Often the procurement of technology leaves organisations with a bad taste, as they tend to pin their hopes on the actual technology to bring forth the much-desired efficiencies. This is not because technology failed, technology works, but works within context of process and people. Knowing the current business processes will allow the technology to be used optimally, also, having properly skilled people, will lead to the required value-extraction from the technological investment. Case studies

on this topic are many the world over, whereby putting faith into just one of the components, have in some instances run up costs of hundreds of millions of dollars for large organisations. Additionally, in most of the robust software solutions, one usually find that the software contain a number of the core organisational processes built in (e.g. Financial controls, procurement, HR, Payroll); however, the organisational business rules and processes are usually unique and would require either changes in the software or changes in the actual business processes. The choice, in such a situation would naturally depend upon a number of constraints (e.g. cost, timelines, skills in the organisation, etc). This again points to the need of an integrated and systemic view of the tactical architecture.

Similarly a strong focus on people, at the expense of process and technological enablement will also be a mistake since the model proposition requires the three components to be viewed as an integrated architecture. A bias to people, may indeed compromise a successful outcome due to his over-concentration on the people aspect. So too would a process engineer or process specialist be blinded to the importance of incorporating people and technology into his mandate without consideration of their interdependencies. Some of the high level detail of this sub-systems follow hereunder.

3.2.2.1 Process architecture

This sub-system deals with the understanding and mapping of core and supporting processes within the organisation, i.e, the business coverage is

contained within the process architecture, providing a high-level map or blueprint of how the organisation works (the flow of work), the triggers (actions which set off the beginning of a process – e.g. procurement of goods), business events, inputs and outputs of the process maps. These become vital in understanding how the business works, which parts create the most value, where redundancy issues may exist, where inefficiencies may reside, and where improvements of throughput can be squeezed out. Having such a blueprint or map, even if at a high level, will allow organisations to better relate to training issues, incentives, automation and technology support.

The diagram below depicts the core sub-systems comprising a typical process architecture. Each of the constituent sub-systems are detailed in Volume 2, Appendix D.

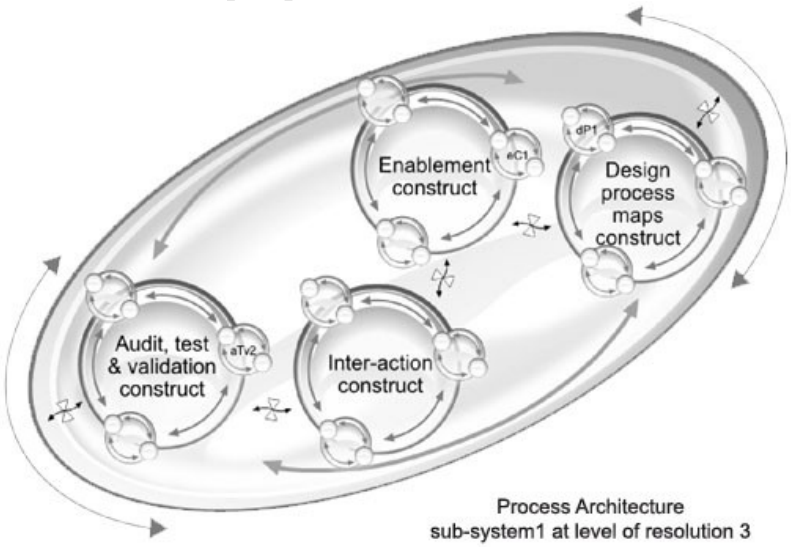


Figure 3.14: Process Architecture sub-systems from the BAT software.

3.2.2.2 People architecture

This sub-system deal with all human capital management issues, the skills required, the remuneration of the skills, the recruitment, the incentive models, the capability of the organisation to change, and its culture. The people component of the business is a vital aspect yet often underestimated, however its prominence has resurged, particularly as reflected in the current and growing trends such as “intellectual capital”, “human capital”, “knowledge economy”. People and their skills should thus be viewed as an equally important part of the tactical architecture.

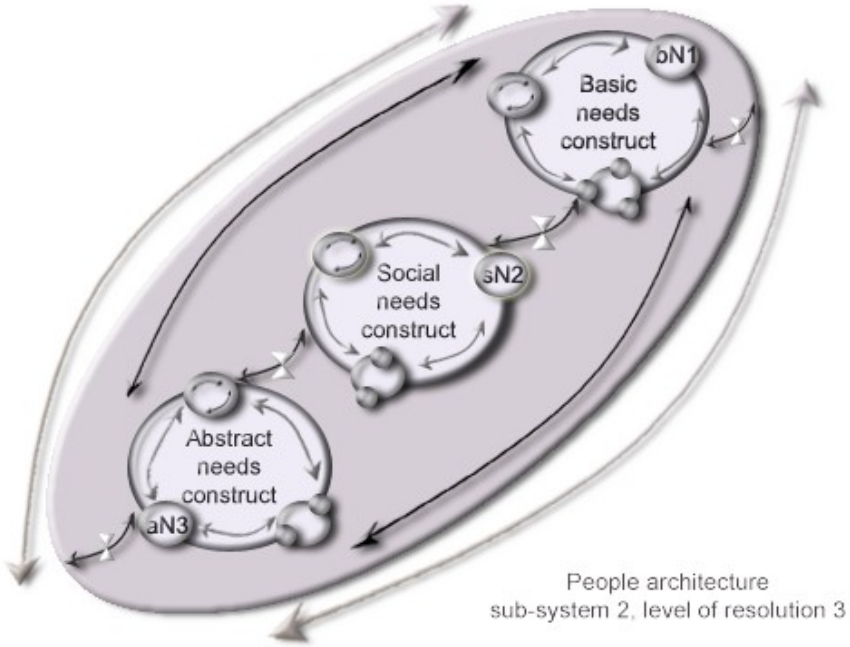


Figure 3.15: People Architecture taken from the BAT software

The diagram above cascades the people architecture construct into its supporting sub-systems. As will be seen, much of the content of the sub-systems relying upon human behaviour based upon Maslow’s hierachy of

needs, although critically ackowledged to have flaws (Taptiklis (2008), notes Maslow's work weakens the notion of society by ignoring the interdependency of social systems, yet his work still impacts thinking on motivation, usually supported by Herzberg's motivators and hygiene factors.

Maslow's contribution was an expanded theoretical chain of needs for understanding individual personality and motivation, claiming a pre-potency, i.e. that the needs follow sequentially (Bellott & Tutor, 1990), which have been critisised by many such as Geller (1982), since it is reductionist and omits people's spiritual dimension, citing that "even starving people are not immune to the lure of higher values". Korman et al (1977) suggest empirical evidence for Maslow's ideas points in the opposite direction, although it provides a useful template to understand how and why people behave, whilst Trigga (2004), offers Bourdieu's works to displace Maslow's regarding the Engel curve since it downgrades social interaction and culture, recognised as a flaw in Post Keynesian economics. These critiques are used to support the displacement of current content of the levels of resolution of the prototype, with more relevant and appropriate systems based research).

3.2.2.3 Technology architecture

The technology sub-system is the third component within the tactical architecture; care must be taken not to view the technology architecture as

information technology (IT) systems only, but rather as technological enablement, implying any form of technological aid (hardware, software, networks, electro-mechanical products), or the physical toolsets produced which are geared to make our lives easier and more efficient (from say a micro-wave oven, to a desktop application). The deployment of technology is predominantly to gain efficiencies and range from calculating, documenting, manufacturing, manipulating, to reporting. It represents a core element in all businesses today (be it on a rural farm – using a plough, or a stockbroker using web-based software to forecast price fluctuations for his clients). Keeping this in mind, technology impact our lives in a very fundamental manner, thus its presence in the tactical architecture.

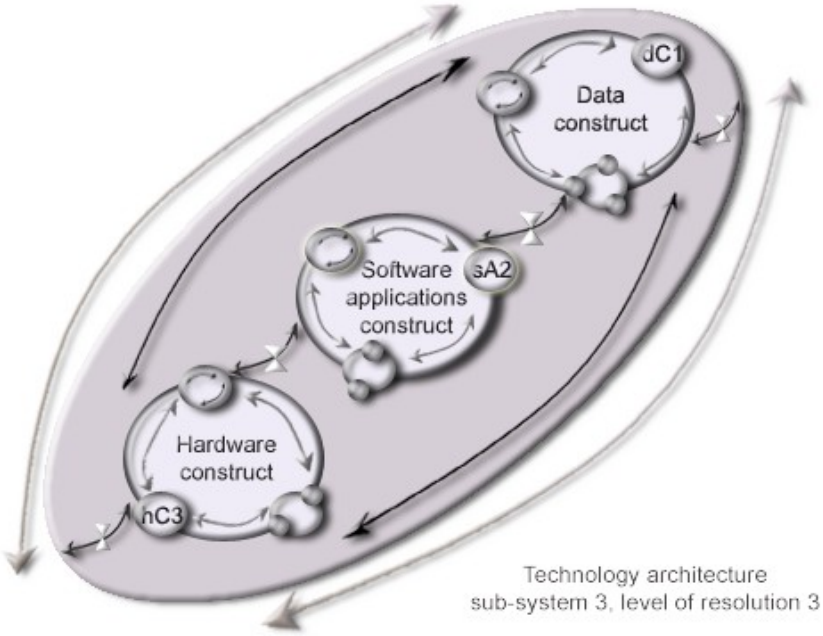


Figure 3.16: Technology Architecture taken from the BAT software

The technology architecure, in keeping with the self-smilar design, depicts its core sub-systems in typical systems engineering and systems design fashion (see Appendix D, Volume 2 for details of sub-systems).

To summarise the Tactical architecture, it can be described as being a function of the process architecture, the people architecture and the technology architecture. In terms of the naming convention of the framework, this function can be captured as: “TA = f(PrA x PeA x TA)”. A complete and detailed review of the Tactical Architecture and its sub-systems are provided in Appendix D, Volume 2.

3.2.3 Operational architecture

The Operational Architecture is the third major sub-system, contained within the first level of resolution of BAT. It represents the focus area of the daily management, execution and running of operations, as opposed to the Strategic Architecture which directs the overall efforts toward a specific direction, and the Tactical Architecture which is more concerned with the enablement or tools that are required to run the business efficiently and effectively. The three core segments together thus represents a total picture of the organisation in a systemic sense. The Operational Architecture, directs its efforts toward matters of operational management, and should, as a minimum be a function of an Operating and delivery construct, Audit and assessment construct, and the Re-alignment and

implementation construct. In terms of the model notation, this would be expressed as: “OA = f(ODC x AAC x RIC)”. This view is depicted below.

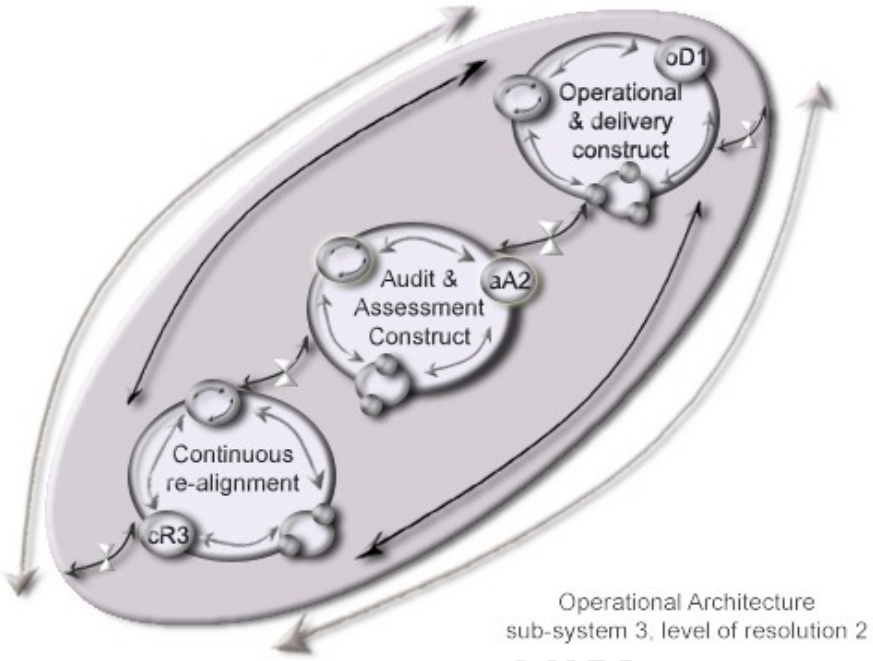


Figure 3.17: Operational Architecture taken from the BAT software

The Operational Architecture is similarly supported by sub-systems at lower levels of resolution. As an example, the Operating and Delivery construct will contain three key supporting sub-systems (Mapping & Planning, Managing, and Delivery).

3.2.3.1 Operations and Delivery

The first of the supporting sub-systems to the Operations Architecture, is that of the Operations and Delivery construct. This sub-system refers to matters of the organisation that lends itself to planning, managing, execution and delivery. The Operations and delivery construct is thus a

function of Mapping & planning, Managing & directing, and Delivery & execution. The diagram below reflects this construction very clearly and yields the model annotation of: “ODC = f(MP x MD x DE)”.

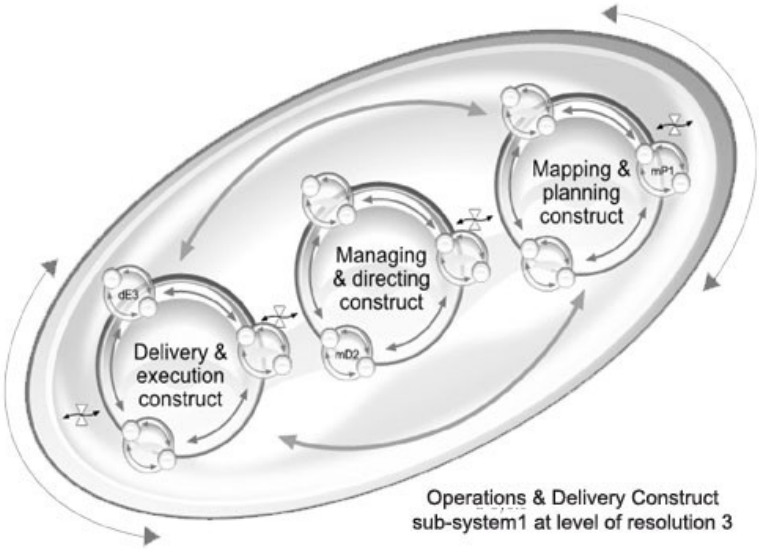


Figure 3.18: Operations and Delivery Construct taken from the BAT software

The operations and delivery construct, is supported by three fundamental lower levels of resolution (Mapping & planning construct; Managing & directing construct; Delivery & execution construct). This level of interconnection and interdependency touches on the heart of certainty and our propensity to have predictability and accuracy with everything we undertake, particularly in terms of planning. The entire journey is in fact a very probabilistic exercise, thus being open to this reality will ensure we develop plans and actions that can be rapidly changed, based upon the realities and learning from implementation. The interrelatedness of planning, directing and executing are shown below.

Mapping, planning, directing & execusion relationship
This diagram indicates the high degree of interrelatedness that exists between various stages within the Operational & delivery construct. Adopting and more importantly understanding the relationship between these phases will ensure effective delivery.

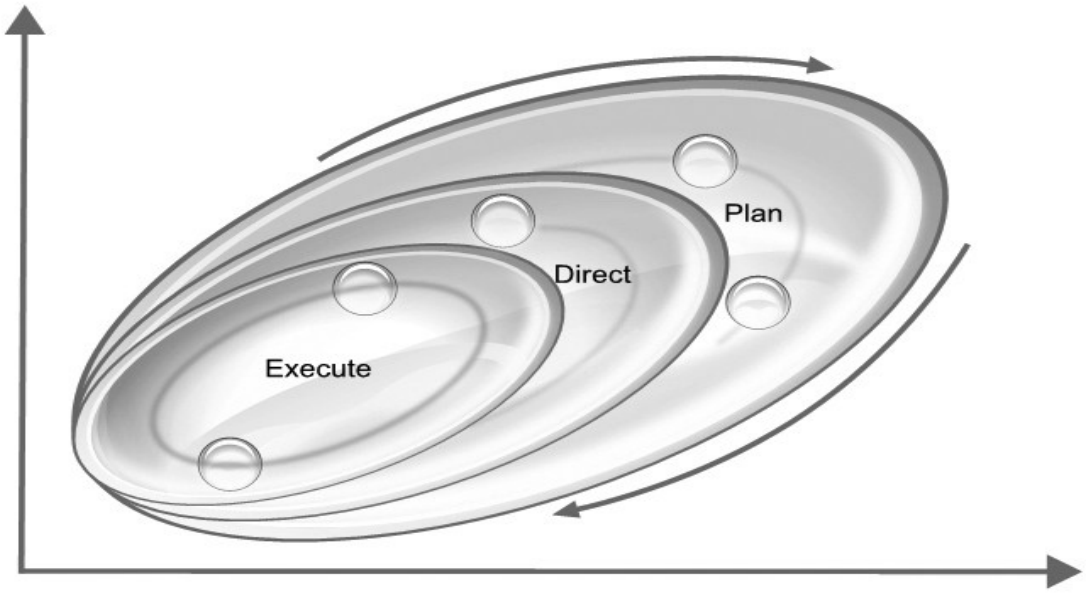


Figure 3.19: Mapping, Planning, Directing and Execution Relationship taken from the BAT software

The intimate relationship between planning, directing and execution as illustrated above (Figure 3.19), alludes to the integrative aspects that links these elements, where ideally our planning parameters must be flexible enough to accommodate the learning from both the execution and direction aspects of the overall programme journey. The various planning tools can easily be incorporated in this segment of the proposed architecture model (e.g. rich picture dynamics).

3.2.3.2 Delivery and execution construct

The third, and equally important sub-system is concerned with the detailed deliverables and milestones of an initiative. This segment requires sound

project management controls and hands-on delivery. It is at this stage where great emphasis resides on time and quality management since it is the root or most granular level of resolution.

Some of the major considerations in this sub-segment would therefore include time management, quality control, i.e., project management aspects. The Mapping and planning, Managing, and Delivery construct as explained above can be reflected by the diagram below in terms of a high-level map.

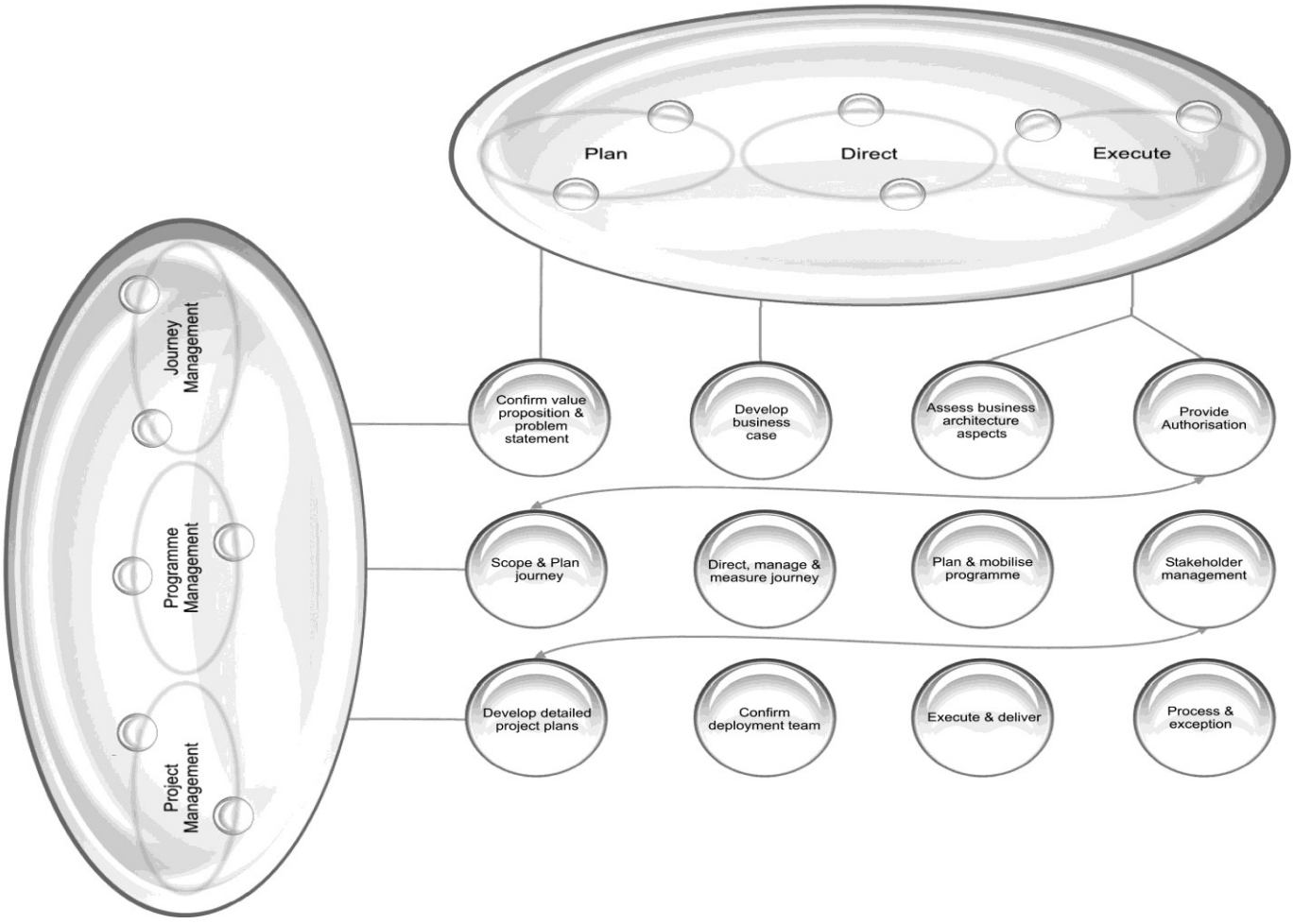


Figure 3.20: The Mapping and planning, Managing, and Delivery construct taken from the BAT software

It is must be noted that the journey includes programme management, as well as project management. So too must planning incorporate managing and executing, both dimensions therefore having a great deal of inter-relatedness.

3.2.3.3 Audit and Assessment

The second sub-system is that of Audit and Assessment, referring to the base activities undertaken when tweaking or fixing operational aspects of the "system-in-focus", be it classified as a business, as a programme, a project, or simply a milestone. The purpose of the sub-system is to ensure that a systemic approach is maintained at all times. To this end, the audit and assessment construct is a function of: conducting an audit or performing an assessment, performing a gap analysis, and Design and Validate the intervention. This level of resolution is captured as: "AAC = f(CAA x PGA x DVI)", and is illustrated below.

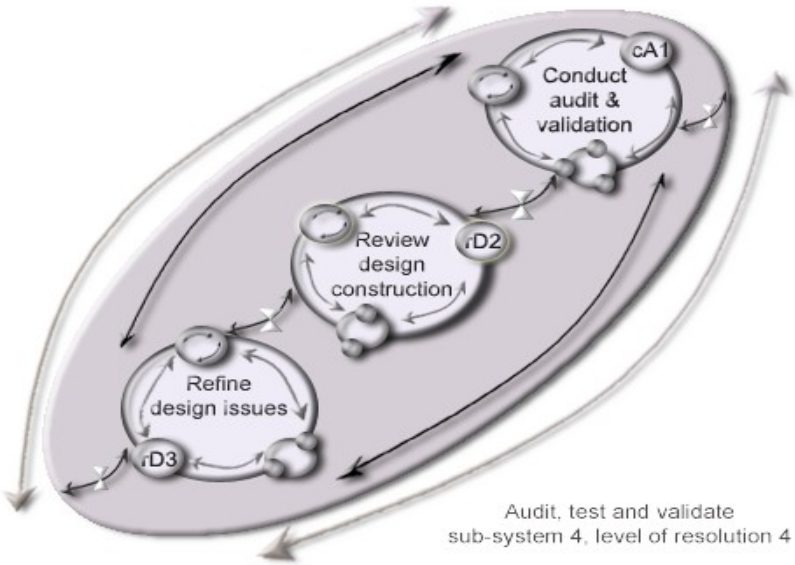


Figure 3.21: Audit, Test and Validate construct taken from the BAT software

As mapped out above, this supporting sub-system is in turn comprised of lower level sub-systems (see Appendix D, Volume 2, for detail).

3.3 Applying and deploying the model

Since all project interventions relate to some form of organisational improvement, and considering that most problem statements are badly constructed, due to limited attention given to the systemic or wicked nature of problems. The protoype theoretically closes the gap between "conception and delivery", since it considers contexts of interventions by identifying how and why sub-systems may enhance or impinge upon the desired outcomes. The action research cycle patterns detail the support improvements resulting from the prototype, covering practical insights from a range of projects in chapter 5.

The prototype implementation model, consist of self-repeating or iterative steps: Consult, Design, Deliver, so as to affirm the expected intervention outputs, to the context (sub-systems of the prototype). As an intervention guide, it highlights the various systems the intervention is likely to impact, and be impacted by. As an example the consult phase serves to verify and ratify the expected intervention outputs in context of the original planning assumptions made by clients, this being the terms of reference or request for proposals supplied to would be implementers. This information is reviewed against the backdrop of the prototype architecture, so as to

ensure that the planned intervention consider systemic aspects of how the plans would impact, and are impacted by the client's specific enablers and environmental context. This produces problem formulation that is more robust and systemic. The proposed solution is subsequently enhanced having deeper and wider consideration and understanding, which is tabled to clients for sign-off or approval prior to proceeding with the delivery phase. The improved problem statement is seen as a systemic map, meaning how the planned intervention touches upon the organisation as a whole (strategy, tactics and operations), and is useful when seen against the original terms of reference or tender documentation. The sign-off process is vital since it is a step whereby the problem statement contains much more information, coupled to consequential potentialities regarding the impact across the organisation. It is also during this step where clients realise the full extent of the problem, requiring them to make final decisions regarding the extent of the intervention to be undertaken.

The practice suggests that when unpacking the problem statement and solution framework, it usually result in various issues, explained under Chapter 5. Deploying the model is derived from the prototype's Operational architecture (sub-system containing the implementation methodology, journey map, programme map, and project map), and can be summarised as: *Consult*, *Design*, and *Deliver*. The diagram below highlights the iterative nature, of these basic steps.

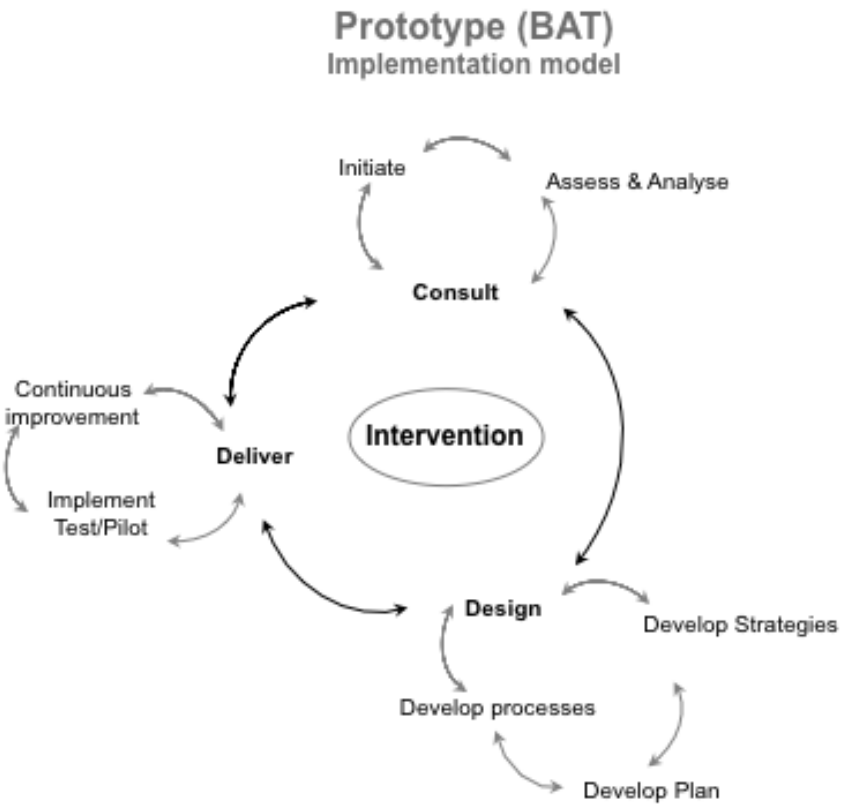


Figure 3.22: Prototype's iterative deployment model

Whatever the nature of the intervention, the ideal prototype implementation steps would include, Consult, Design and Deliver, and is a shortened version of the more detailed programme management model, contained in the operational architecture of the prototype (for detail, see Volume 2, Annexure D). Some detail under each of the sub-systems follows.

3.3.1 Consult phase:

During the "consult" phase, the "system-in-focus" is clarified and agreed upon (i.e., defining the project scope, or focus of the intervention). This phase include a great deal of consultation, research, interviews and related

documentation reviews. The intervention is formally initiated here and it is where the project team develop a "systemic picture", highlighting and considering key internal parameters (prototype sub-systems or internal capacity of the client), and external parameters (3rd party interfaces, legislation, funding, procurement, resource constraints of the extended value chain). This information is synthesised, and act as primary input into the next phase. The consult phase have two major steps;

Initiate – where the intervention is formally initiated, and contains the sign-off of important governance related matters (terms of reference; draft service level agreement; steering committee member nominations and adoption; minute and reporting formats; project contact list; payment conditions and mechanisms).

Assess and Analyse – review of both "external and internal environments" to yield a "*systemic map*", revealing the interplay of key parameters impacting the intervention, directly and indirectly. The review of the external environment include industry specific information; threats, competition, sensitivity to high level extended value-chain (EVC) issues. The internal assessment and analysis is where the prototype is used for a reference point, obtaining client information relating to the capacity and robustness of their Strategic, Tactical and Operational Architectures.

3.3.2 Design phase:

The improved problem statement mimicks a systemic map, showing how the planned intervention touches upon the organisation as a whole, and is useful when seen against the original terms of reference or tender documentation. This phase uses the “systemic map” which is the wider and deeper understanding of the problem in context of the organisations architecture, so as to assist in developing a robust solution to be implemented. This is used to alert and disseminate the potential impact of plans on affected stakeholders. Once this is achieved, the development of the final delivery and enagement processes are developed and signed off. This information also yields the base-line planning to be presented, including the first detailed implementation plan.

Develop implementation strategy – this segment involves taking stakeholders through the “systemic map” to explain the nature and implications that decisions and actions to be taken, may have across the organisation. The adoption and choice of strategies is a vital deliverable of this stage.

Developing the engagement and delivery processes – this segment relates to defining the governance, complaince, procedures and protocols that need to be observed during the execution of the intervention, an important element in public sector since much delays tend to be introduced by ignoring these aspects. The lack of appropriate governance or the adherence thereto, often result in great problems in practice, e.g. when

project teams are asked to continue with work, without formal approval via the procurement processes of the client.

Develop plan – this segment takes all the work of the previous stages and proceed to develop a detailed project plan, and serve as the base-line, with deviations and amendments following a very specific process in itself, i.e feedback loop between planning and implementation.

3.3.3 Delivery phase:

The delivery phase is about implementation, based upon the plans developed in the previous phase. It contains two steps, implementation; and continuous refinement, both aspects require management of the project team to ensure promised quality, milestones and objectives.

Implementation – this segment is where the BAT's programme management model is activated, covering the entire journey of the initiative, and requires focused project management and exception reporting.

Continuous refinement – this is the feedback process, and represent the area where improvement/s are noted, recorded and actioned in a defined process of approval and governance, which forms the basis of the next iteration of the implementation model, much like those used in action oriented research models, like for example, Kemmis (2009).

The iterative deployment aims to provide a robust, well conceived plan of action, that allows the learning to be constantly infused into the deployment, ensuring improved quality functions. The diagram below depicts the iterative deployment method, in terms of the self-similar structure of the framework.

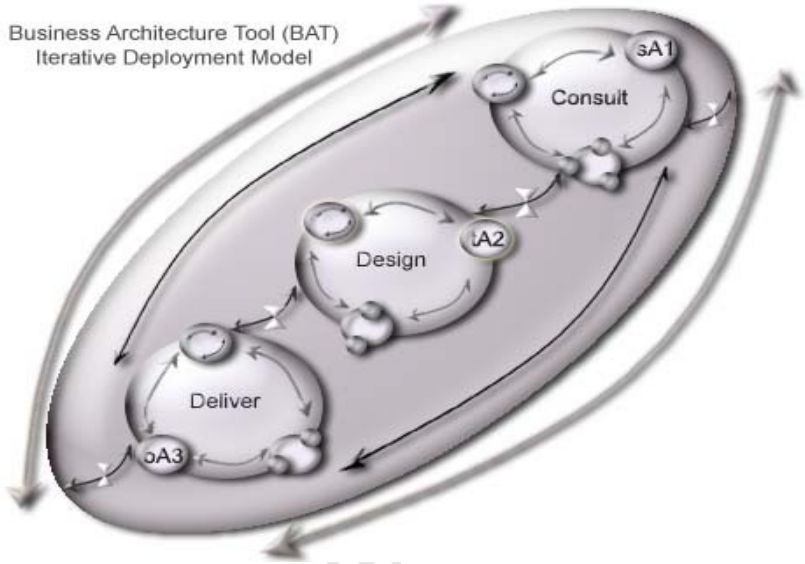


Figure 3.23: Prototype integrated Deployment Model taken from the BAT software

The deployment model is an attempt to fuse typical system engineering parameters, with minimal but requisite governance constructs, creating a "lightweight", yet robust implementation approach (lightweight, implying a reduction of traditional volumeous project documentation without compromising quality and integrity).

3.4 Summarised attributes of the prototype

The inclusive and integrated nature of the framework aligns itself with the thinking that methodologies can and should be decomposed if and when appropriate, such as the System Dynamics model, used for cognitive mapping (Mingers and Brocklesby, 1996). Furthermore from a Critical Systems Thinking perspective, it puts different management science methodologies, methods and models to work, in a coherent way, according to their strengths and weaknesses, to improve complex societal systems (Jackson, 2001), supported by plural systems approaches discussed by both Jackson (2001), and Checkland & Schon (1990).

To reinforce how the prototype aided the various interventions, it may be useful to repeat: The Strategic architecture promotes careful problem formulation, enforcing the development of a rich picture, ensuring broader systemic aspects are recognised during problem formulation; The Tactical architecture recognises the work of system dynamics, where focus have shifted regarding developing learning processes in order to share mental pictures (Senge and Sterman, 1992), specifically how enablers of process, people and technology, is a vitally interconnected architecture that require optimisation based upon the unique parameters of the “system-in-focus”, in part supporting socio-technical systems theory, that encourages greater harmonisation between social and technical systems (Herbst, 1974); The Operational architecture in turn adopt project management principles to

guide the process of an iterative deployment technique, supporting hard systems thinking; The self-similar design parameters such as it's oval system-in-focus boundary; it's constituent sub-systems; it's attenuators and amplifiers between sub-systems, are meant to act as a reminder of the interconnected nature of social systems.

The prototype benefits are summarised as: Promoting integrated, holistic and interrelated notions of planning and delivery; Improved problem definition; Multi-methods and tools from systems arena, and traditional management science, within a framework that seeks to be evolutionary by its design as well as content (current and future knowledge). Since systems science methods and tools tend to require systems knowledge to implement effectively, the adoption of more "common" archetypes and naming conventions are aimed toward greater familiarity, adoption and acceptance. To summarise, the model wish to capture some of the following systemic principles:

Self-similar design parameters – the shape, look and feel of the levels of resolution are self-similar, promoting easier usage and serve as a reminder of interconnectedness between sub-systems and the "system-in-focus".

Improved problem definition and solution architecture – the nature of the prototype prods and asks stakeholders questions from concept to delivery (strategic architecture requiring insight in terms of what is needed, and why; tactical architecture questions reveal the internal capacity

assumptions; the operational architecture, questioning the detailed actions to be taken). All of which help to define problems in greater context and provide clarity as to how best to attain the outcomes.

Integration – the sub-architectures and sub-systems of the model enforces greater attention to matters of integration, both within sub-systems, as well as external extended value chain areas, impacting upon the project, intervention or "system-in-focus".

Requisite variety – the framework promotes and supports the notion of having adequate variety to effectively resolve issues (problems cannot be solved at the level they are created or exist), like for example "would-be-improvers" would have to have one or more agents having the variety to capture the detail and understanding of the architectures and their sub-systems;

Emergence – The structure and design of the framework allows for emergent phenomena to be appreciated and indeed facilitated. The importance of facilitating emergence also supports the drive for innovation and creativity (multiple view-points, stakeholders, events are allowed to flow through the architecture within managed dosages via the attentuators).

Attentuators and amplifiers – the model suggest using attenuation and amplification techniques (although not being very prescriptive, see Volume 2, Appendix E). The importance of these measures are to ensure that the "right noise" are allowed to permeate the system, with the "wrong noise"

being minimised in order to retain a sense of both focus and innovation. The diagram below attempts to reveal the qualities and concepts above, due to the extent of the levels of resolution (7 levels), it proved difficult to map all into a single view, and as such the diagram depicts level 1 to level 4 for illustrative purposes only.

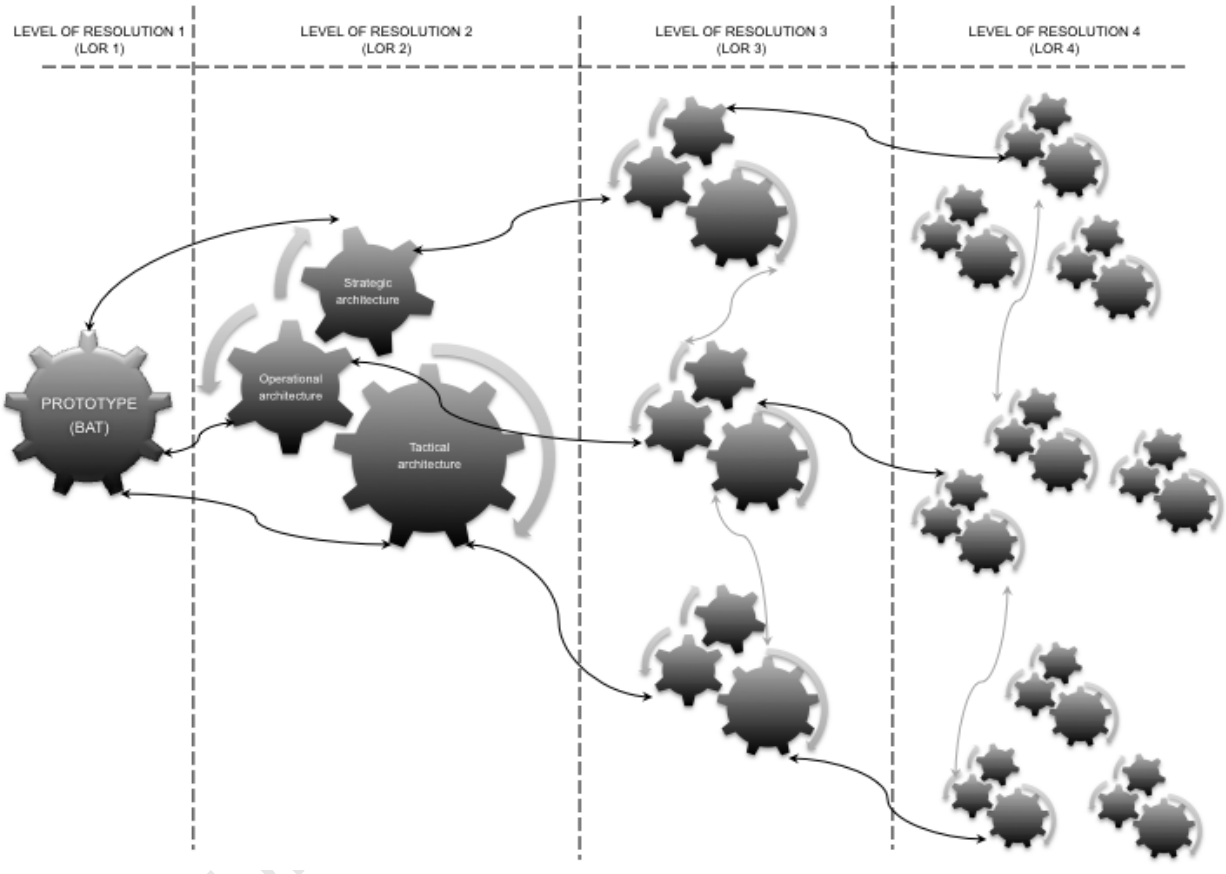


Figure 3.24: Underlying characteristics of the model

The nature of the systemic relationships and the multiplicity of activities can be observed in figure 3.25, where each cog-shape encloses its supporting sub-systems, as illustrated in the detail of the framework using eliptical shapes. A variation to the above is the matrix view sketched below.

The diagram is much the same as the one above, but contains added detail of the actual content as reflected in the model detailed in Appendix D, Volume 2.

Business ArchitectureTool - model structure:

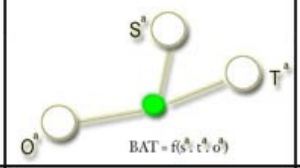
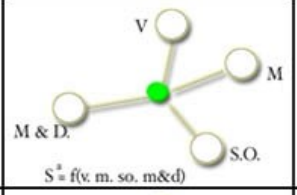
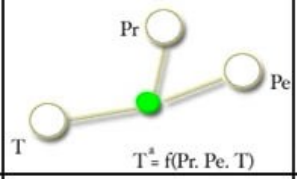
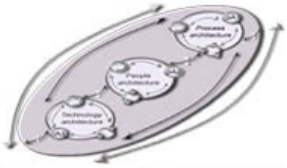
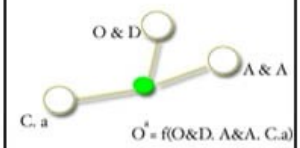
Name	Abbreviation	Symbol	Structure	Appearance
Business Architecture Tool (LOR 1)	BAT	B^a		
Strategic Architecture (LOR 2)	S-arc	S^a		
Tactical Architecture (LOR 2)	T-arc	T^a		
Operational Architecture (LOR 2)	O-arc	O^a		

Figure 3.25: Prototype structure taken from the BAT software

The concept captures the function of each architecture and its sub-system components, forming the basis of the prototype.

The annotation below describes the primary level of resolution.

$$BAT_i = f(S^a ; T^a ; O^a) + \varepsilon_i \quad \text{where } i = 1, \ldots n$$

- i is the level of resolution for the system
- ε is the error factor for the amplifiers or attenuators for the overall system
- S^a is defined as the Strategic Architecture
- T^a is defined as the Tactical Architecture
- O^a is defined as the Operational Architecture

The model content is not under review (i.e. what constitutes the key elements of the sub-systems, as noted under the "absorption" discussion), the important aspect relate to having an integrated whole to improve service delivery problems defined as systemic, messy, or wicked. The application of the prototype was executed under 3 cycles of action oriented research, using various project interventions, much like Foucault's research approach by studing power positions from the bottom-up perspective (Foucault, 1977b, 1980b), and coincides with the principle and practice noted by McNiff (1988) that stresses collaboration with others as vital, whilst it can be a personal endeavour as well, whereby researchers share their own practice results with others (McNiff, 1994a). Additionally, work by Zuber-Skerrit et al (1990) stresses the self-reflective spiral of planning, acting, observing, reflecting and re-planning. This supports the notion of a reflective practitioner or researcher, as well as the importance of having feedback and continous improvement elements, as suggested in the prototype.

CHAPTER 4: RESEARCH METHODOLOGY

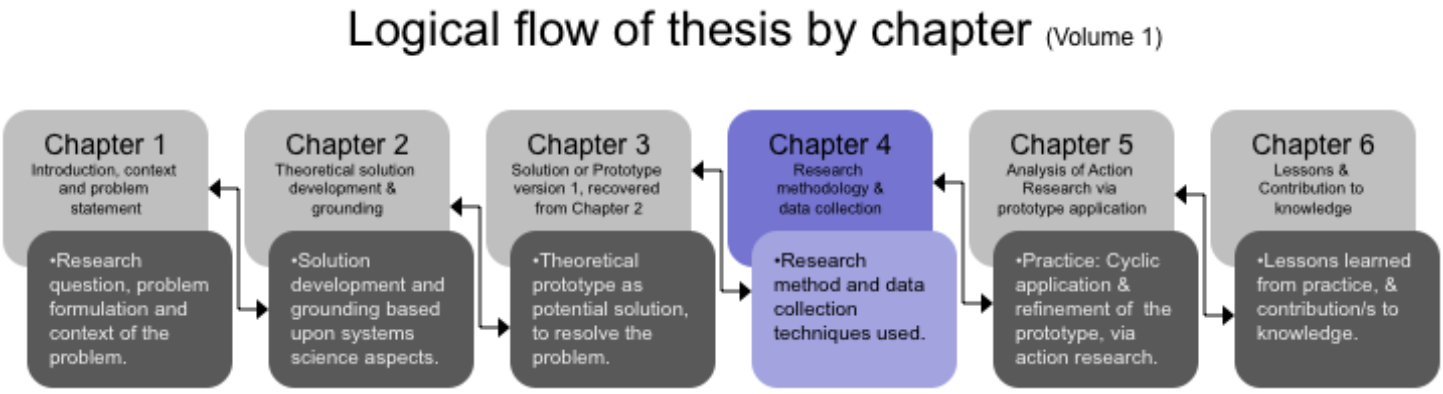


Figure A.4: Repeat of figure A, highlighting chapter specific focus and content

4.1 Action oriented research aspects and the overall developmental strategy

Dick (1995) suggest the most effective research methodology as one that generates data and interpretations appropriate to a given context, cemented by work of Graziano and Raulin (1993), referencing situations where the control of variables are impractical and ethically challenging. These words summarises my perspective and the actual practices in a real context, where theoretical perfection invariably becomes muddied through the dynamics of multiple effects from multiple agents and agencies. It underlies the notion of wicked problems, or messy situations as it is called by various researchers, affecting both change and understanding in a situation in which it is difficult to control variables due to situations being

complex and on-going (Dick 1995, 1995a; Susman 1983). Practitioners of action research develop responses to complex situations that are generally laden with unpredictability, unconventionality and innovation, that generate the "uncontrollable" critique when compared to traditional research (Dick, 1995; Susman, 1983; Altrichter, 1993). The methodology of action research is a cyclic form of self-reflective inquiry, commonly used in social settings to improve a researchers own practice and the understanding of their practice and the situation (Carr and Kemmis 1986). This is supported by action research being seen as "ways of investigating professional experience which link practice and the analysis of practice into a unified and continuous sequence" (Winter, 1996), or where people reflect upon, and improve their practice via the interlocked cycle of reflection and action, running concurrently throughout the practice period.

This approach conforms to the work by Dick (1995) referring to action research as a cyclic movement starting with fuzzy questions, through fuzzy methods, to fuzzy answers, which leads toward less fuzzy questions, less fuzzy methods and less fuzzy answers. The key element cited by researchers and practitioners remain the cyclical acting and reflecting, before acting again, executed in a continuous loop of improvement, generating rigour in process, and confidence in outcomes via validating and refining of data and interpretations. Authors ranging from Dick 1995; Zuber-Skerritt 1990; Oja and Smulyan 1989; Carr and Kemmis 1986; Heron 1985) support this view. Data collection, rigour, interpretation, and

validity is supported in the cyclic activity through: the collection and interpretation of data in each research cycle before testing both data and interpretation in later cycles; seeking to disconfirm emerging interpretations in each cycle; critiquing and refining methods of reflection and action in each cycle; seeking out divergent data to challenge other data already collected. Also, literature provide additional source of disconfirmatory evidence, as well as the process of implementing emergent changes from the action research process (Dick, 1995a). This approach suited my research and developmental work because of:

- my role as designer/consultant and agent providing intervention support in a real social situation where intervention variables are difficult to control;
- the cycles of action and reflection provide for data collection and interpretation of the experiences from all participants;
- the reflection phases enables me to develop understanding and respond with actions, aimed at improvements, to generate further and deeper understanding and learning in terms of the intervention outputs and the prototype;
- the reflection phases provide for disconfirming evidence and challenging data;
- the cyclic iterations allows for the identification and implementation of action to enhance outcomes of both the client outputs and the prototype;

- contains flexibility for emergent learning and permits the use of intervention data and the interpretation thereof, to alter future action for testing.

These features generate positive outcomes for the action research itself covering: client intervention outcomes; and improvements regarding prototype. The outcomes have a strong local relevance, and may enrich at a universal or global level. The latter having been noted by Dick, 1995; Susman, 1983; Kemmis, 1990; Zuber-Skerritt, 1990. These observations acknowledge the "trade-offs" observed in action-oriented research whereby social situations being complex and changeable, are "traded" for the reward of having flexibility and responsiveness of action research's qualitative data that produce understanding and change. The constructivist/interpretivist position adopted for this work provide for interpretation of agents and agencies mental constructions of their experiences (Guba & Lincoln, 1989; Graziano & Raulin, 1993; Patton, 1990). These authors acknowledge the advantage that quantitative data offer in applied, concrete, real world situations. Examples where researchers questioned their use of action research as a methodology, relates to weak participatory processes (Simonson & Bushaw, 1993; Vakil, 1994), and notions of intra-subjective and inter-subjective engagement with action research (Lomax & Parker 1995). Having noted this, I remain steadfast in my adoption of method as it assists in surfacing assumptions relating to ontology, epistemology and human nature, whilst providing the capacity for rigour via cyclic iterations, and use of qualitative data to

contribute in terms of depth, openness and deeper understanding. The purpose of this research and development effort, as noted is: **"to develop a systems-based, design and delivery tool, to practically assist in better integration, from concept to delivery".** Such a tool should have ingredients to help organisations (social systems), manage and navigate their dynamic landscapes more effectively and efficiently, and importantly add value, to the current contraints in developmental economies, more specifically, the South African public sector, needing practical integrative implementation methods and tools, to assist national imperatives. Considering the unique South African heritage and institutional problems depicted in figure 4.1 below, highlights the messy, wicked context of the South African developmental challenges.

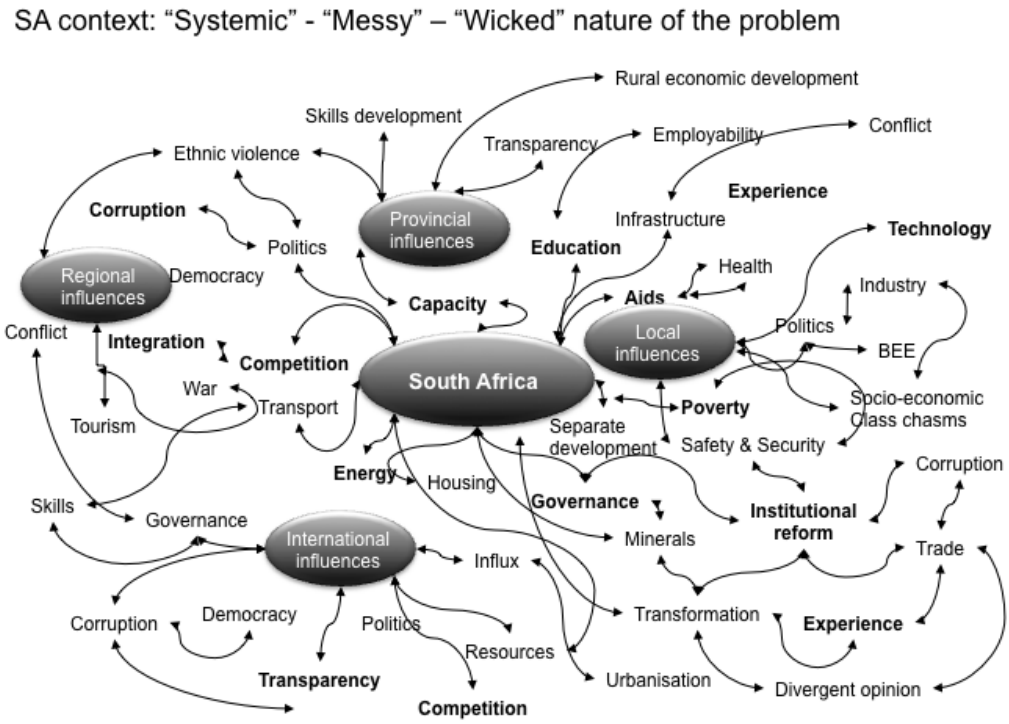


Figure 4.1: The local context sketched in terms of the multiple, systemic, messy, wicked, local nature

The prototype aim to provide support to current delivery approaches, with specific attention to *improved problem definition* (taking a holistic view of the problem); *improved strategic capacity* (questioning and aligning intervention objectives, to that of the strategic objectives of the agency); *improved integration* (integrating planning and structural or organsiational parameters and delivery mechanisms); *adaptive programming* (whereby planning assumptions incorporate aspects of dynamicism regarding potential value chain elements impinging upon delivery). In short therefore, the main aims of the study are:

- to develop a "Design and Delivery support system (prototype), able to accommodate key features of an integrated and dynamic environment;
- to test the potential efficacy, performance and value of the Design and Delivery support system (prototype), in practical local contexts;
- to observe whether complex, messy or wicked-type problems can be dealt with, in a more coherent manner in practical situations;

The aims as stated above seem reasonable from the viewpoint of a student, regarding the diversity in the literature of intervention and change, necessitating the search for coherence, quality and innovation. From a practical viewpoint (public officers, service providers, contractors, suppliers), the work may be useful since the lack of service delivery across the value chain are increasingly under the local and international spotlight. From experience and engagement in these areas, the features of

misalignment, poor planning assumptions, massive delays, and non-delivery of key infra-structure elements, are already having a detrimental effect on SA's developmental possibilities. From an academic research point of view, there seem to be a need to explore innovative ways of deploying accepted systems theory constructs into the realm of practical organisational tools (Flood and Jackson, 1991a; Schön, 1983 ; Checkland and Scholes, 1990; Senge, 1990). The relevance of the topic appear to hold greater significance for societies where traditional methods of planning and management are facing seemingly unsolvable delivery problems.

The divergent SA public sector outcomes, when compared to those aimed for (e.g. skills transfer, local economic development, all vital policy ideals), seem to be undermined by the lack of deeper integration. This study intend to provide insights able to support transformational and developmental economies. The complexity that accompanies such planning and design parameters tend to fixate upon policy ideals, which are not adequately supported by integrative, systemic thinking and implementation platforms able to match dynamic and fluid implementation realities. The aims, are supported by the practical goals covering: whether the local planning and programming techniques can be enriched; whether integrated planning and execution models present improved practical outcomes (with rapid delivery in SA being foremost); whether seemingly conflicting policy ideals, such as Accelerated Shared Growth Initiative South Africa (ASGISA), and Expanded Public Works Programme (EPWP), versus efficient and rapid

service delivery, can be more effectively implemented using systems tools. These goals are important from an institutional reform viewpoint, especially since the SA public sector have various impediments to overcome whilst still having very optimistic infrastructure and service delivery targets. The socio-political frustrations make this vital for SA, expressed in the myriad of mistakes and “quick-fix” attempts across public sector enterprises.

The general apathy in the public sector, appear to be a legacy issue in itself, and as such, should be incorporated into strategies, planning dimensions, and execution parameters that form the rich-picture of the local landscape (figure 4.1 above).

The author’s previous exposure to systems science and applications to various local and international projects presented an opportunity to investigate how the systems family of research could add value to this specific context. Research covered systems thinking (e.g. Jackson, Ackoff, Flood); cybernetics (e.g. Wiener, Ashby, Beer, Ulrich), complexity science (e.g. Prigogine, Kauffman, Lucas); Management theory and Organisational Design (e.g. Checkland, Argyriss, Keys). All of these thinkers and research fields present an opportunity to use, infuse and add constructs contained in the prototype developed. Practical experience reveal a poor local capacity for such systems principles, and suggest that many of the management fads are attempts to offer relief from dated, misaligned and invalid organisational practices and theories (Freedman, 1992). Management remain inclined toward determinism and the search for equilibrium, with

management theorists basing their techniques on a mechanistic metaphor (Morgan, 1986). A different approach is needed in order to understand organisations as complex systems, and that such models could promote research into a more robust and appropriate philosophy, i.e. the science of complexity (Banathy, 1984; Mesjasz, 1988). Much has been done in this regard (Vullierme, 1987), which was used as a platform for this work. The systems-related body of knowledge is vast, impacting a number of niche areas, however underlying commonn features are interrelatedness and interconnectedness of systems and sub-systems. Another feature is that of feedback loops and the dynamic learning and the adaptive nature of complex systems.

As highlighted, a key research question arising from the above relates to our own capabilities and that of our social structures, regarding the ability to assimilate information, process it, and respond to it appropriately. Furthermore, a central concern of organisational science is to understand how people construct meaning (mental models), and how this impact their action, i.e., at places of work, managers '"enact" the environment, effectively rearranging, constructing and reconstructing objective parts of their surroundings, all in an attempt to remove chaos and randomness (Weick, 1995). It enables better understanding of how the co-producers produce the problematic behavior of the essential variable under consideration. From an experience viewpoint, the problem seem to be that the various, parallel changes and pressures create great practical delivery problems. These tend to stem from the inability to respond to the

challenges in terms of its systemic effects, whilst adopting linear-based planning, and mechanical delivery assumptions, all of which are ingrained into public sector thinking. It is therefore an integral aspect of the research to provide insight of how best to build competence or tools in order to improve practical, integrated planning and delivery capacity.

4.1.1 Research paradigm considerations

In seeking to resolve the problem, two steps were important: (i) review of a range of systems thinking and complexity science literature, aiding model design and; (ii) the application or testing of the proposed model in multiple and different live project environments.

This application feedback, was in turn used to enrich both the project contexts and the prototype, in an iterative cycle of improvement, thereby retaining the evidential mode of argumentation whereby different types of testing are incorporated in the spirit of what is sometimes called triangulation in the language of research methodology (Maanen, 1983).

The three basic research paradigms include, “Positivism” embedded in a quantitative approach; “Interpretivism”, also called the qualitative approach; and “Critical science”, which explores the social world in order to understand how society functions. This work adopted a qualitative research approach, i.e., "research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss & Corbin, 1990). The underlying assumption of interpretivism is that the

whole needs to be examined in order to understand phenomena. Interpretivism is critical of positivism as it seeks to collect and analyse data from parts of a phenomena and, in so doing miss important aspects for comprehensive understanding of the whole. The increasing awareness and importance of augmenting traditional research with more practical approaches (e.g., Pedler, 1991; Jackson, 1991), was found to be appealing for this work as the outcome of the prototype performance are expected to yield tangible application value in alleviating service delivery challenges. The work support the importance of action research i.e., traditional research being seen as the sole process of producing validated and trusted knowledge. Various arguments for alternative forms of academic work were found to be advocated in the applied disciplines, e.g., systems practice (e.g., Checkland and Scholes, 1990; Jackson, 1991), action research (e.g., Clark, 1972; Fals Borda and Rahman, 1991), reflective practice (Schön, 1983), and practice of action learning (Pedler, 1991). All highlighting the intimate linkages to practical improvements through change, development, learning, and adaptation.

Although much data exist regarding differences between qualitative and quantitative methods, both rest upon a rich and varied traditions from multiple disciplines and both have been employed to address almost any research topic. Some commentators believe that both are to be used, in what is referred to as a "mixed methods" approach (Mckinlay, 1993). The kernel of the debate seems to be philosophical, not methodological. Many

qualitative researchers operate under different epistemological assumptions, compared to quantitative researchers (Murphy, et al, 1998), e.g., many qualitative researchers believe the best way to understand phenomena, is to view it in context, and sees quantification as limited in nature (as it focus upon a small portion of a whole, that cannot be separated without losing the essence of the whole phenomenon). The extent to which these two methods are contested known as the separatist versus combinationist debate (Duffy, 1987), reveal the divergent viewpoints that still exist. Proceeding with the qualitative tradition lies in the SA context, appearing to lack holism and integration from planning, through to delivery. Also, this tradition emphasises process, and dynamicism of social life, having a preference for longitudinal designs, and prolonged engagement or study period, suiting this body of work.

The issue of quality and validity in qualitative research remain a heated debate (Sandelowski and Barroso, 2002), supported by Morse et al. (2002), citing that theory on the subject itself has become muddied, and suggest validity and reliability are achieved when the researcher rigorously follows a number of verification strategies in the practice. Sandelowski (1993) argue validity not to be linked to “truth” or “value” as in positivism, but rather to “trustworthiness”. Trustworthiness has been further divided into credibility; dependability; reliability; and transferability (Lincoln & Guba 1985, Graneheim & Lundman 2004). Others like Sandelowski (1993) still question qualitative reliability tests like: checking with participants after

data analysis; or peer checking (a panel or single subject expert). Guba and Lincoln (1989) regard member checks as a critical technique for establishing credibility, whilst Morse and Field (1996) referred to qualitative approach, as an homogenous, inclusive label, supported by Munhall (2001) citing common features of holism; focus upon human experience; sustained contact with people in their natural environment; researcher involvement; descriptive data, which is also supported by the list from Streubert and Carpenter (1999).

Dick (1997) proposes action research to deal with the noted difficulties better than other approaches, whilst ensuring high levels of rigour, in instances where other paradigms experience problems, like practitioners who deal with complex social systems, like for example Cook and Shadish (1986) in the field of program evaluation; and Checkland (1981) who documents his own move from hard systems analysis to soft systems analysis. Dick (1997), rightly suggest that "The scientific method" was not developed by using “the scientific method”, it was more of a trail and error, or as he calls it, a bootstrap operation which evolved to suit particular outcomes in particular environments. So despite action research not being an “old” practice, the varied and numerous practitioners have learned to do it well, in the same manner they have learned most of their professional practice, meaning, by doing it. Dick (1997) explains how action research can achieve high levels of rigour without sacrificing responsiveness and flexibility that some situations require. An assertion is an interpretation of

evidence, which in turn are drawn from the data in the study, and from literature. First, at each cycle the researcher may try to disconfirm the emerging interpretation; Secondly, at each cycle the methods used can be critiqued and refined; Third, data collection and interpretation can be included in each cycle (meaning data and interpretation can be tested in later cycles); Fourth, divergent data can be specifically sought out; Fifth, the literature can be used as a further source of possible disconfirmation (the researcher who seeks disconfirming literature, and failed to find it, have a more warrantable assertion than could otherwise be claimed); Sixth, the planned changes which emerge from the program are derived from the data and the interpretation, offering a further opportunity for disconfirmation.

All of these may therefore offer warrantable assertions as noted by Dick (1997), supporting the chosen research journey for this work, describing: Conceptual framework, Research Question, and Research Methods to be used in the pursuance of the stated goals. These elements are merged into the overall “square framework” (C-Q-A), which intend to highlight the Relevance, Utility and Validity of the body of work. A number of philosophical perspectives are available to guide researchers, each with its distinctive nuance on what is achievable through qualitative research, e.g: Heuristic research, a perspective whereby we search to understand one’s own self and the world(s) in which one lives (Moustakas, 1990); Intervention research, often seen as restrictive due to the difficulty in overcoming conceptual barriers (blind spots) that may exist, which in turn

impinges development of new ideas regarding the topic (Fryer and Feather, 1994); Grounded theory approach (Glaser and Strauss, 1967); Naturalistic inquiry (Lincoln and Guba, 1985). Both naturalistic and grounded processes of inquiry highlight the importance of cementing whatever conceptualisations a researcher produces; and Ethnographic research (Sanday, 1983), an extension of Participant observation, provide crucial information about a process, a community, or a domain of action.

The interventions or projects undertaken for this work, cover a variety of public sector departments, across various programmes providing the demarcation. Key in executing these projects require that interviews and documentation reviews are performed as part of effective project execution, thereby revealing practices, models, and the type of conceptual vocabulary being used by communities to refer to their work. The application window is in excess of 6 years, with varying degrees of project type and depth, exceeding 70 projects in total.

Feedback from implementations provided improvements to the prototype through the iterative learning process, like the model of Stephen Kemmis, illustrating the cyclical and iterative nature of the process, each cycle having 4 steps – Planning; Acting; Observing; and Reflecting (see figure 4.2).

Action Research Process:
Adapted from MacIsaac, 1995.

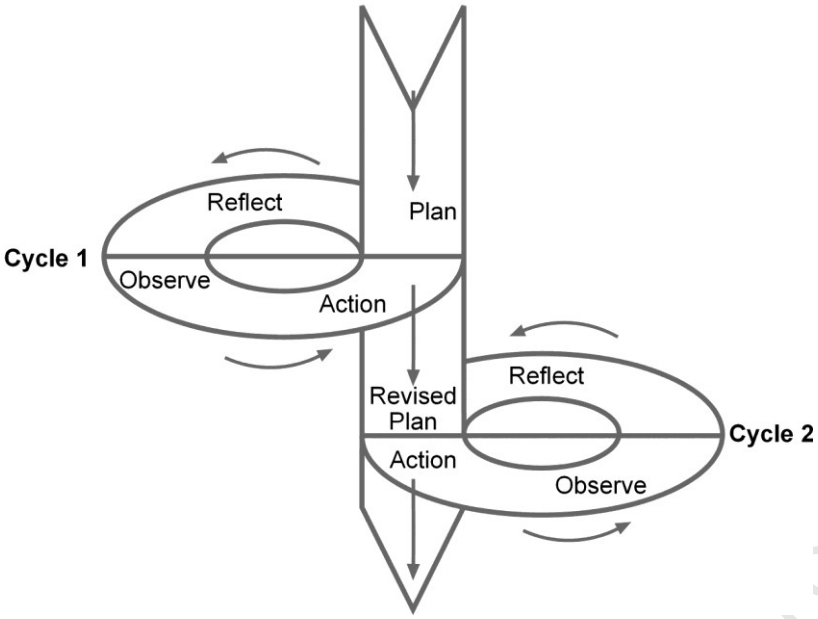


Figure 4.2: Action Research Process adapted from McIsaac (1995)

The encompassing spirit of the study, promotes the collection of various research material (e.g., facts, experiences, reports, arguments, and thoughts), and from core families of literature (e.g., systems theory and complexity science; management, improvement and organisational development, action-oriented research). These families of literature appear sufficiently broad to ensure effective conceptual and theoretical positions are maintained. The literature review and research executed within the "square framework" (***C-Q-A***), is based upon the assumption that there is something wrong with the current situation (e.g. lack of service delivery; divergent programme outcomes); which give rise to a ***concern*** that need to be addressed (low systemic appreciation of problems; bad planning; no real integration); and developed into the research ***question*** (to search for practical tools or models to improve service delivery); that lead to the

research ***answer*** (the prototype), with it's motivation and rationale made explicit by providing an evaluation of the practical lessons and experiences (see figure 4.3 below).

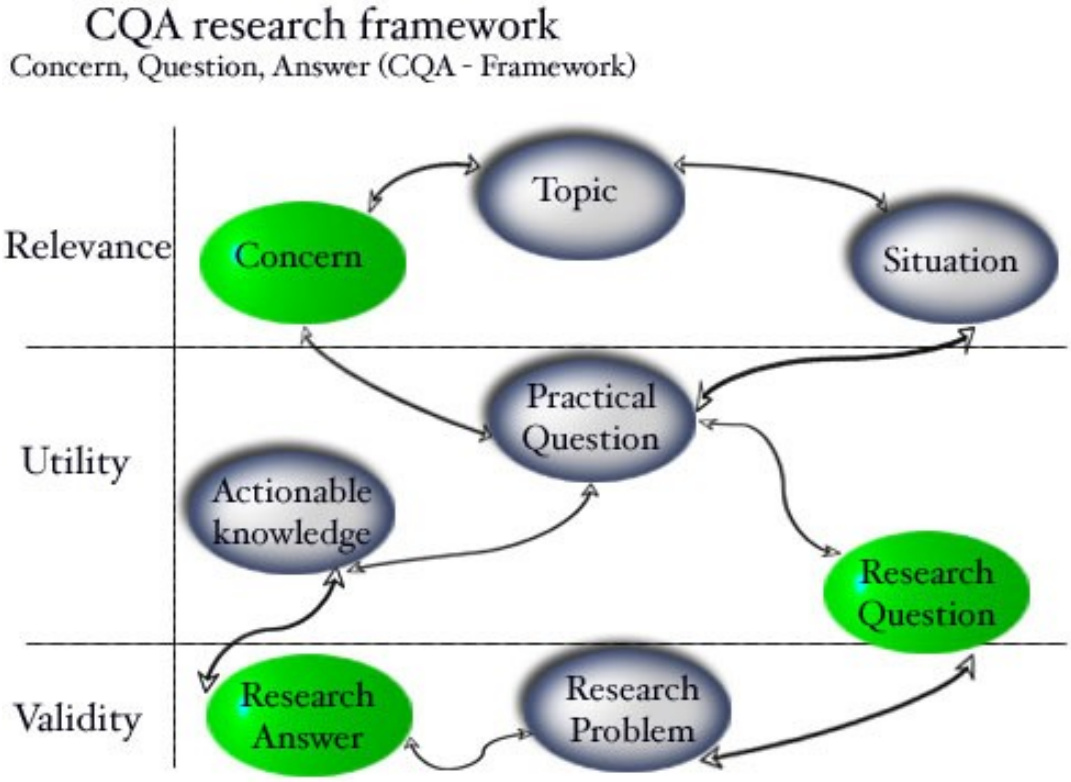


Figure 4.3: CQA Framework

Figure 4.3 was used to ensure the process of inquiry adheres to an acceptable analytical path, with the general concern stemming from traditional management, planning and service delivery being steeped in a mechanical mindset. The prevailing Newtonian paradigm being inextricably linked to how we observe, learn, classify, and make sense of the world. Organisational science, as a consequence, is equally entrenched in this model thinking, with most of our endeavors directed toward equilibrium, command and control structures.

This Cartesian view is reflected in our obsession with predictability and certainty, be it control of our social systems, mechanical systems, and even our natural systems. The local concern therefore prompts the research question in terms of finding ways to improve upon current planning and implementation approaches so as to appreciate dynamics of complex systems. This in turn gave rise to the formulation of the prototype, applied and tested across a number of interventions. The reflections of thematic outcomes of the interventions provide useful insights for both practice and research of systems science in general. The research question therefore has been developed to see if a systems-based delivery tool could add any practical value to the local challenges.

4.1.2 Data collection, sampling and the research framework

The research answer (prototype), seeks to improve service delivery from concept to completion stage.

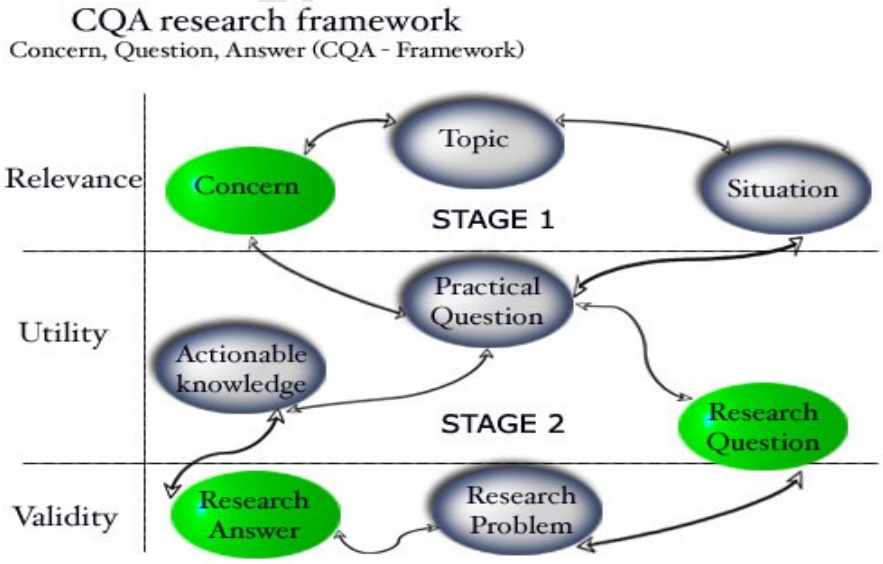


Figure 4.4: CQA research framework executed in two stage process

Figure 4.4 models the qualitative research design adopted, retaining necessary academic rigor, whilst allowing the author latitude of reflexion throughout the journey. ***Stage 1*** relate to the issues of the motivation, problem statement, and the approach adopted. ***Stage 2*** relate to the actionable knowledge created, to help solve the practical delivery problems and possibly institutional improvements regarding systems-based integrated planning and delivery. As noted above, one of the concerns of qualitative research is that it fails to meet the criterion of generalisability, often held to be the hallmark of science (e.g. Smith, 1975; Kennedy, 1979). Much qualitative research is carried out in a single setting, or with a small sample of informants and thus fails to provide the sample statistics upon which inferences can be based (Miles and Huberman, 1994). This body of work however enjoys a large time-scale having multiple projects (in number and scale), various participating public officers, with different mandates and functions. Many qualitative researchers use non-probability sampling for practical rather than principled reasons. The researcher may use theory to make predictions, and use theoretical sampling to test the robustness of predictions under different theoretical conditions. Some of the sampling techniques generally used are: Probability sampling (its strength being statistical inferences); Opportunistic sampling (where opportunity guides the choice, e.g. doctors and nurses (Hammersley and Atkinson, 1995); Non-random sampling (for its representativeness); and Theoretical sampling.

A number of authors (Mitchell, 1983; Bryman, 1988; Silverman, 1989) have argued it inappropriate to consider selection issues in relation to case studies in terms of generalisations from samples to populations or universes. Rather sampling should be directed towards making possible generalisations to theoretical propositions. Firestone (1993) outlined the logic of generalising to a theory, using theoretical sampling, where the researcher uses theory to make predictions and then seek cases that will allow for testing the robustness of predictions under different regimes. This was also the technique, thinking and route adopted for this body of work, since the systematic collection and objective evaluation of data is another vital element, looking at past occurrences in order to test hypotheses concerning causes, effects, or trends of events (Gay, 1996).

There are three primary methods of data collection. Interactive interviewing, where people are asked to verbally described their experiences of phenomenon; Written descriptions by participants, where people are asked to write descriptions of their experiences of phenomenon; and Observation, which is descriptive observations of verbal and non-verbal behavior, allowing tacit knowledge to be communicated through the use of rich descriptions (Myers, 2002). The use of observational research techniques is one of the hallmarks of the qualitative research tradition, and in context of this body of work, client staff participating in interventions were interviewed; asked for existing documentation; observed in action whilst participating in the intervention,

all of which are acceptable data collection techniques (interactive interviews, written descriptions, & observation), and a requirement based upon the implementation model of the prototype. In other words, to build the "As-Is" assessment for interventions, it warrants the actions noted above, through the implementation approach, which being cyclical retain stakeholder participation throughout the intervention. The participant observer gathers data by participating in the daily life of the group or organisation he studies, discovering their interpretations of the events he has observed (Becker, 1958; Goffman, 1961; McCall and Simmons, 1969; Denzin, 1970; Silverman, 1985), which was another key activity on all interventions, tying into the observation technique noted above, complimented by interviews, whilst the analysis involves identifying the meanings attributed to objects and events by members of the culture.

Importantly for his work, naturalistic observation suggests social attitudes like prejudice are best studied through observation in natural, real-life situations (Sechrest, 1979), giving insight in this context to the words, technique and manners in which clients plan and execute functions. Discourse analysis is a very large subject (Lemke, 1995a), the language people speak or write becomes research data only when we transpose it from the activity in which it originally functioned to the activity in which we are analysing it. This displacement depends on the processes (e.g., task-construction, interviewing, transcription, selection of materials) where the work of the researcher shapes the data.

The feedback, from the practice at intervention level, including project documents, workshops, and discussions between participants assist in terms of the local interpretations and meaning of text and how these connect to events, which in this context was the activities of the interventions (Lemke, 1985, 1988a, 1993). There are many schemes for contextual factors (Erickson & Shultz, 1981; Hymes, 1972b), all include participants and their social and physical relationships, material objects and semiotic representations in the physical environment. In addition to the context of situation, there is also the context of culture (Firth, 1957; Halliday & Hasan, 1989) that is indexed by a text. Considering that most of these techniques were used and are available when executing an intervention, the SA public sector, therefore provided a rich bed of data, to observe intervention plans, actions, responses and outcomes.

Discourse analysis is suited when examining a particular community in depth, yielding insights when rich contextual information is factored into the analysis of episodes. Longitudinal designs or extended case studies are well suited for discourse analysis methods, and is also the reason why this body of work focused upon the longer case studies and interventions, so as to produce learning about a particular class by observing patterns and strategies. Some of the key data collection elements include client documentation, meetings, minutes, interviews, workshops, recordings (e.g. N2; OAG; DoJ & CD projects), and other intervention field notes. All organisations are still dependant upon paperwork (Atkinson and Coffey,

1997), thus informal documentation and material may be useful regarding comparisons and insights of data (Hammersley and Atkinson, 1995), which refer to this study where participants often share information and documents as part of the intervention being undertaken.

All projects executed by the designer/firm, used the prototype to varying degrees. The projects in turn were secured through formal public tender process and proposals submitted to potential clients. The success rate of securing or winning tenders and proposals are seen as being random and probabilistic since it is based upon market conditions, covering a number of factors such as opportunity, competition, pricing, solution offered, and client relationships (i.e., opportunistic sampling). These conditions in themselves are seen as being effective sampling as it is based purely upon the dynamics at work in the real world processes of market mechanics. Indeed one of the insights in this regard relates to the work of Oliver Williamson, citing the uncompetitive positions adopted by agencies, such as typically securing long-term contractual arrangements (Williamson, 2005). Similar dominant positions are seemingly resident across various segments of economies, as supported in this research (e.g. Vulindlela and IFMS projects) as well.

It is the author's view that results from the field, provide generality regarding common practices in the local context, such as consistent challenges relating to: problem definition; fragmented planning; and static-type implementation techniques. These challenges have been highlighted in the lessons from the practice, including the prototype's potential contribution to mitigate against such risks. Actionable knowledge informs the user not only what is likely to happen under the specified conditions but how to create the conditions and actions in the first place (i.e. creating utility, and demonstrating relevance). It should contain propositions used in the world of practice and, if used correctly, should lead to the predicted consequences and not have counter effects, i.e. generalisations that are transferable and usable over time and under different conditions and contexts (like the prediction of N2 project funding collpase; DoJ & CD project sponsor absence). The propositions that comprise the theory must be equally learned and used by actors and stakeholders in the situation (i.e. it must have transferability, as a contribution to knowledge). These objectives will be difficult to fulfil since, even if all the practical project implementations are conceived, designed, and implemented successfully using the prototype, doubts will still remain as to whether the prototype would have worked as well had the context been somewhat different.

Given these parameters, the author also applied a variation of what are sometimes called post mortem studies, where a completed research project is re-interpreted and critically discussed from a new conceptual standpoint.

The aim is usually to shed light on the successes and the failures of the project, identify alternative directions the project might have taken, and reflect upon possible contributions the project could have made. Based upon this view, it was ensured that the reflexivity or post-project reviews serve this purpose across all the application cases. The project successes, having improvements at the local, practical level (e.g. SASSA project reduced service delivery throughput from 128 days to 33 days; OAG project's improved problem statement and insights relating to the client's lack of focus on it's technical architecture; N2 gateway project integration and funding pre-emptive alerts), tend to be short-lived.

A large threat to the institutionalisation of these improvements relate to the limited time of the researcher and the project team to transfer systems knowledge to clients. Additionally, the public sector's propensity to adopt innovative techniques and dynamic planning elements are severely limited. This was evident across interventions, speaking directly to: the pervasive mechanical mindset; inability to usurp skills transfer; constraining work environment. Practice improvements on the projects resulted in the thematic grouping of improvements (see themes and patterns, Chapter 5), including a greater capacity to plan for the unexpected. This serendipitous consequence revealed a key finding relating to the Extended Value Chain (EVC), and the implicit and tacit assumptions agents tend to make across, within and between agencies operating in the EVC. This finding mirrors the long-route-of-accountability done by the World Bank (Keefer and Khemani,

2005) in other countries, highlighting its potential value and contribution. The thematic improvements suggest clarifications regarding topical and even unresolved issues in the ongoing academic debates about hard and soft systems and the need for practical system tools that are simple to use, without the need for extensive systems knowledge.

The conclusions point toward future research regarding greater systemic absorption as promoted in this work. The inferences and discussion, could also contribute to increasing knowledge and research in terms of extended value chains (EVC), and the dynamics relating to such complex and enmeshed socio-economic systems. The assessment suggests a positive general outcome in addressing the research question.

Importantly, the prototype reinforces the value of systemic insights that improves problem definition, which integrates into better planning and a more alert delivery orientation.

The relevance and lessons may contribute toward some of the following areas:

(i) Insight into conflicting mandates that exists in developmental economies, where agencies have essential service delivery targets, whilst faced with multiple resource constraints, yet are expected to provide rapid delivery and integrated socio-economic enablement. The improved problem statement development and integrated

notions of agency sub-systems assist in revealing implicit and unrealistic performance assumptions of organisations itself;

(ii) Provide a systems view of integration, within and between various agencies, and their programmes of implementation, which if executed properly can deliver greater efficiencies across multiple agents and agencies across the extended value chain (EVC);

(iii) Introduce a potential base-line prototype that could be refined and improved through further and alternative research strategies using multi-methods for multi-actor contexts;

It may be relevant to the domains of organisational development, and systems theory in providing insight from research fields investigating complex, interactive, and collective phenomena.

The results appear to contribute to a broader process of preparation by local agencies, contemporary organisations, communities, and other human collectives to deal with the uncertain, unpredictable and dynamic realities of our social systems.

4.1.3 Context, Theory, Practice and the developmental journey

The **Context** – refering to the context of the study in its broader sense, having a SA specific nuance, provide vital contextual grounding, allowing the reader to appreciate the systemic nature and consequences of actions and decisions, whilst accomodating legacy issues.

The **Theory** – refers to the vast resources accessed, and why they were considered relevant (Systems family of research; Action-oriented family of research; General improvement research; Philosophical considerations). The literature reviews serve as a vital component to the thesis, more so when considering that it was used to derive the prototype, prior to it's application.

The **Practice** – refer to the application of the prototype via a number of action research cycles. The practice aspect is expected to yield the improvement and enhancement of the prototype via feedback from live interventions across the research period (cyles 1 to 3).

The 3 elements of practice, theory and application are repeated throughout the body of work, via the action learning cycles (see figure below), explicating the overarching framework of the journey.

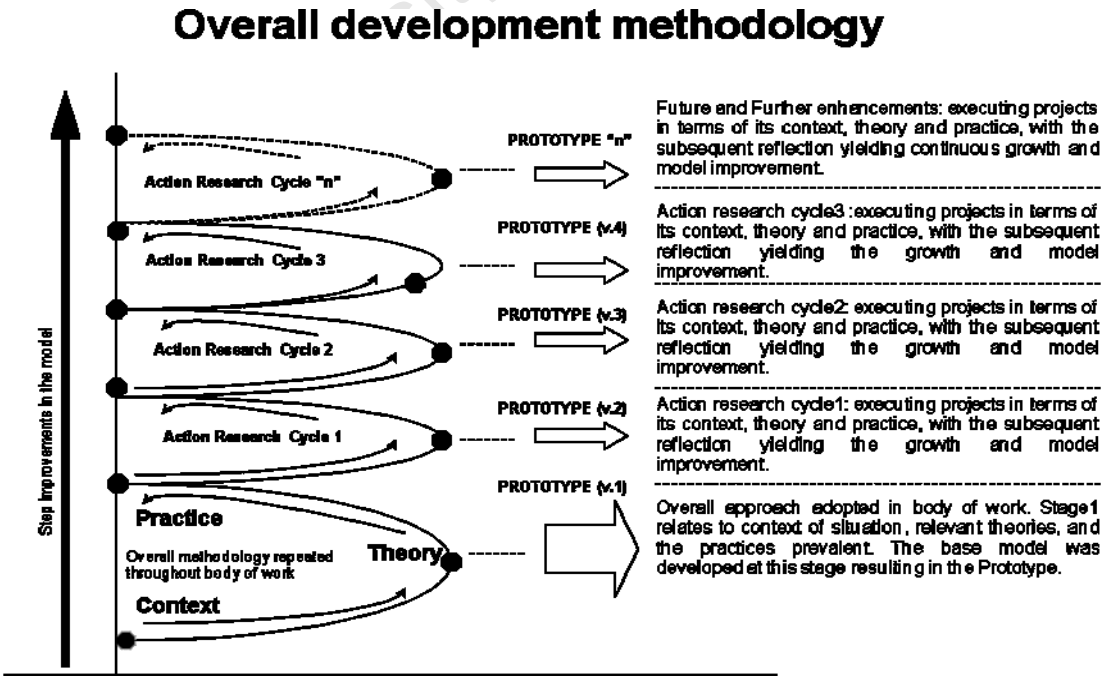


Figure 4.5: Overall development framework (Context, Theory, Practice)

Figure 4.5 above, is an inclusive version of the previous figure 4.2 (Kemmis) and figures 4.3/4 (CQA). It depicts the iterative, cyclical steps of Context, Theory and Practice, for each succesive round of the action research periods, with each cycle yielding an improved version of the prototype (denoted as Prototype v1, v2, and v3). This process retains the iterative logic of both "Kemmis and C-Q-A" models, whilst generating improvements in the prototype via the project feedback, allowing the author to retain his sense of direction and purpose. Under the iterative step of *Practice,* the assessment, review and description of how the management practices and processes of the real-life situations, impact both knowledge creation and service delivery. The journey undertaken during the period of the work, conforms to the logic of discovery and validation applied in sociology, and supports the view that discovery is equally scientific as validation, since it is really the basis of speculation, which leads to the construction of a hypothesis, and then a research problem or programme (Bourdieu, 1999). Bourdieu's concepts of habitus, field and capital, arguably constitute the most significant and successful attempt to make sense of the relationship between objective social structures (institutions, discourses, fields, ideologies) and everyday practices (what people do, and why they do it).

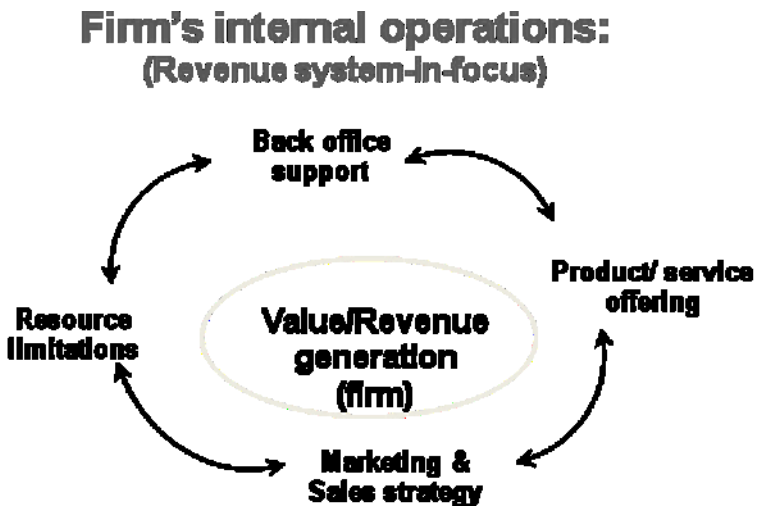


Figure 4.6: The test firm's revenue seen as the "system-in-focus"

The figure 4.6 above wish to establish a mental image of how context, theory and practice was used and reflected upon in terms of the running of the firm, which is one of the "two worlds of applications" – i.e. "The world of the Designer" meaining, the operations of the firm itself; "The world of the client" meaning the interventions or projects executed by the firm, for it's cleints. The 2 "worlds" are seen as complimentary both in terms of creating value to the user or client, and providing feedback as to the efficacy of the prototype (see Chapter 5, for detailed logic of sub-systems).

Application of the prototype covers a range of programmes and projects within South Africa, over an extended period between 1999 and 2009. The exploration of practice is meant to verify the prototype's ability to provide value regarding integration, and efficient programme delivery. The nature of the applications cover a wide spectrum of project typologies, like Education, Finance, Engineering, Social welfare, presenting the author

with a rich test-bed across a variety of fields and organisations, allowing for:

(i) Incorporating multiple projects, allowing the exposure to remain sufficiently wide in terms of the extent of the activities, and the type of interventions;

(ii) Collecting data covering oral and written reports from individuals, organisations, groups and programmes engaged in the research process;

(iii) Document and refine the framework improvements, as well as the client value-add realised in the process of verification.

As noted the prototype was tested across, “the world of the client” and “the world of the designer/firm”. The nature of the client interventions, assignments, projects, or programmes managed by the firm were determined by market forces in its normal daily practice of competing for business (opportunistic sampling), ensuring little restriction existed in terms of the range of activities covered under the exploration. The 2-Worlds are interconnected and interrelated, typically securing projects in a competitive market space requires all responding vendors (the firm) to possess the ability and capacity to respond to project opportunities. The implied capacity refers to being able to compete on core business issues such as cost, methodologies deployed, implementation skills, and the ability to market, position and network. These aspects particularly from a systems perspective, covers the overall interests of this study as well as the

concepts derived from the literature review. The risk in adopting this overall stance resides under the general assumption that pure profit motives have a distinct ability to impact the research process. The mitigating argument in this instance may not present sufficient protection against such bias, however it remains the position of the author/designer, that value-creation to the client is foremost, at all times, a central belief retained in the organisational growth strategy, and reflected in the various project documentation.

The total number of clients, projects and programmes engaged in this regard exceeds seventy (70), across four (4) Provinces (Gauteng, Eastern Cape, Western Cape, North-West Province) in South Africa. The test range described, attend to concerns of width, depth and quality of the testing procedure. The expectation was to observe the prototype's performance across the diverse base, to obtain insights and improvements. The linkages between the intervention types (the "worlds of designer; and clients"), itself are high, and expanded upon in Chapter 5. Key to note is that all of the project interventions have a distinct support function, purpose, duty and mandate that are expected to be fulfilled by communities, stakeholders and individuals. Apart interventions are South African organisations, with most interventions being for public sector organisations.

The primary "connecting pattern" can be ascribed to the client-organisation's respective mandates of rendering some form of public utility,

"patterns which connect" from Bateson (1979). This view lends support to the broad purposes of the study, i.e., *to develop a generic tool to guide work in the area of integration with respect to organisational development planning and implementation*. In terms of extending the idea of "patterns which connect", it appears that a great deal of similarities exist across the different organisations, more specifically in terms of the lack of integrating their efforts from "cradle-to-grave", i.e., the ability to deliver a project or programme from concept, through execution, to final delivery. The connecting pattern extending to the lack of integration and innovation (subsuming effectiveness and efficiency). Although the notion of integration and innovation may be explicated in various ways, the interest here is, the lack of integrating activities throughout the organisation itself and it's extended value chain (duties, activities residing outside of the ambit of accountability of the organisation), as well as the limited propensity to introduce innovations, by such stakeholders. Results indicate varying degrees of local improvements, which appear to be impinged by virtue of on-going or continued mentorship, guidance and adaptation of the different kinds of events and potentialities obstructing or facilitating local improvement. The range of client organisations included, Manufacturing, Social development, Education, Small business, Engineering, Housing, Process, Policy and Compliance, with the projects being equally diverse (Information Technology, human Capital Management, Process expertise, Project management).

The lack of internal resources in government forces it to seek external private sector support like interim consulting services or, outsourcing, but often leads to greater dependencies, and does not address continuity, integration and innovation for improvement in viability. Other difficulties referred to are the enormity and the complexity of some of the client problems, which must be execute under extremely stretched resources.

The term global improvement refers to the results of a systematic study of the local improvement, i.e., how it arises, what effects it has, whether it can be achieved in a different context, whether the resource involved in it and the process of bringing it forth can be improved. As identified in the literature, such global improvement is a characteristic feature of research-based support. The local improvements suggests positive outcomes arising from the use of the prototype, by understanding the issues, problems and constraints as a collective and integrated system. The nature and detail of how these are addressed are client specific (budget, urgency, lags and delays). From a global perspective improvements at intervention level provide for greater clarity and improved ways of thinking about, and solving problem, with the practice indicating improvements in conceptual understanding, flowing into implementation of interventions.

Where these improvements tend to fade relates to the ongoing systems orientation, retention and enhancements post interventions, a weakness predominantly arising due to the inability, or lack of capacity needed to nurture and grow the new found systemic understanding.

4.2 Action oriented considerations impacting, and used by this body of work

Baskerville & Wood-Harper (1998), discuss several problems related to action research, like the dilemma between practical goals and research goals; the possible bias implied by the funding structure of the research; and the increasing association of action research with consulting. In mitigation to this, it may be useful to use experiments and practice studies as supplementary approaches, thereby retaining an appropriate level of research discipline, ensuring sufficient rigor in terms of validity and reliability of the results in relation to actual experience (Munk-Madsen, 1986). These arguments support both the action-oriented research cycles adopted, as well as the reflective and cyclical method of improvements produced in the process. Caution throughout the process have been to ensure the approach remain grounded in Participation and Communicative action, whilst being Critically informed, ensuring the research competence contain qualities of reflexion, i.e. be self-critical (examining one's assumption via self-reflection and dialogue); be emancipatory (adding value by helping others in emancipating themselves from one's claims, and their own); be ethical (be transparent to the value implications of claims and limiting these accordingly).

The broad literature area of personal, professional, social, cultural, economic and political aspects tend to have a familiar strand, usually called sociology of knowledge. There are many contributors to this strand, Deetz, Knorr-Cetina, Merton, Bernstein, and Woolgar (Leydesdorff, 1995; Deetz, 1995), with an acute awareness growing over the years in terms of how knowledge is produced. Knowledge it seems is borne out of a politically charged, socio-cultural context of real people with real agendas working within important personal relationships and institutional ties. The more that the professional production of knowledge has been studied, the clearer it is that it differs little from the processes by which ordinary everyday people go about making sense of their world with others (Deetz, 1995). It appears logical that traditional research knowledge is the most appropriate way to act in most situations, however, despite this sense, the notion has been criticised in the literature, with Latour (1987) raising the question “How do ordinary folk go about their daily business without science”. Cognitive psychologists call this “domain-specific knowledge” (Eysenck and Keane, 1990; Simon, 1973).

There seem to be literature actively attempting to retain traditional views of science, reason, and truth, under the sociology of science (e.g., Gross, et al., 1996). There are those who believe that emphasis on the social and cultural aspects introduces misunderstandings about science (Bunge, 1996). A similar comment has been made by Bricmont (1996), which allude to misunderstandings regarding differences between determinism

and predictability, between laws of science and the way the world actually works, including the creation of confusion regarding concepts such as chaos, complexity, entropy, and open systems.

Bunge (1996) suggest research be viewed as a social and cultural practice, executed within institutional systems as the literature of sociology of science depicts, but it would still need to be demarcated from other types of practice in order to redeem its distinctive character. The demarcation issue has been discussed in various literature (de Zeeuw, 1995; Gower, 1987; Magee, 1987; Popper, 1979; 1980).

These sentiments underscore the variety of approaches and philosophies of research. The literature about the goals and methods of social science (Humphries, 1997; Denzin & Lincoln, 1994; Guba, 1990; Lewin, 1946; Ryan, 1965), tries to address the methodological difficulties of social research regarding its goals and methods. Ethical (Hammersley and Gomm, 1997; Hammersley, 1997; Fals Borda and Rahman, 1991; Jackson, 1991), or a “scientific ethos”, ensures science protect itself against fraud, motivate and reward its practitioners, and keep itself free from external influences. Most of these considerations have been applied whilst completing this work, and based upon the results, there appear to be two broad areas of improvement:

(i) local improvement – the support research lends to practical situations and specific users;

(ii) global improvement – the support research lends in terms of ongoing theoretical development, support and value add;

These gains are partly why action research have been used across a range of specialised areas: Agriculture, Rural Development, Technology Development, Community Development; Education; Health; Urban Planning; and Social Development, generating a large repository of literature on the topic, with a number of commentators proceeding to regard action research as an emerging profession (Stringer, 1996). The term action research dates back to the late 1940's (Blum, 1955; Chein, et al., 1948; Lewin, 1946). Prior to this, various equivalent models such as: action method; deep action method; interaction research; role research, have appeared in the earlier 1940's and even earlier such as the work by J. L. Moreno in group psychotherapy from the first World War, i.e., 1914-1918 (Gazda, et al., 1997; Moreno, 1937a; 1937b; 1943). Two contemporaries, J. L. Moreno (1889-1974) and K. Lewin (1890-1947), are seen as pioneers regarding systematic analysis of human behaviour.

4.2.1 Present approaches linked to this action-oriented research

Some observers make a distinction between action research and applied research, typically some researchers working on action-oriented projects (organisational planning; social improvement), have realised that the concept of "expertise", between these two areas, may prove challenging for various reasons (see, e.g., Ulrich, 1987; Webber, 1981; Emery, 1981a). Action-oriented research is seen to involve the generation of domain

specific or context specific knowledge, and not purely the application of pre-existing knowledge, with a range of models emerging in terms of how it has to be done (see summaries by Flood and Romm, 1996a; Moggridge and Reason, 1996; and Reason, 1994a).

- **Action learning**

Action learning is one of the early models of executing everyday problem solving in groups, this being the primary driver of management learning and development (Pedler, 1991; Revans, 1982; 1988). Revans, who initiated action learning in the UK during the 1930's is generally linked to organisational development type work. The many supporters of this view contends that class-room led training programmes alone do not solely create management expertise, but rather that such expertise are learned through experience, reflection and implementation lessons, which can be summarised as: Ignorance of the learned; Questioning insights; Learning expert (Revans, 1998).

- **Action science**

The action science approach is usually associated with the likes of Argyris, Schön, Putnam and McLain-Smith (Argyris and Schön, 1974; Argyris, et al., 1985). It is ideally executed in a client environment, where members engage in a process of "free and open inquiry" to reflect and reconsider their own "empirical, interpretive, and normative claims" (Argyris, et al., 1985). In this sense a large part of this work can be claimed to be Action science based since all project interventions executed, were for external

clients. This “variation” of action research seeks to unlock individual “defensive routines” automatically deployed when challenged with creativity and innovation. By making people aware of these defenses, it is expected to allow for “double-loop” learning, which is a method of focusing via experimentation of familiar patterns, maps and thought practices (Argyris, 1985). Double-loop learning corrects errors by reviewing the underlying values and policies of the organisation (Argyris, 1993). Apparently, both these types of learning are necessary in organisations, and as will be shown, were exceedingly prevalent in the action research cycles and interventions for this research.

- **Action inquiry**

Action inquiry is interchangeably used with action science, however the literature tends to promote a difference, in that Action Inquiry is said to have developed from Action Science, seen to have shortcomings relating to the practical creation of working examples of “communities of inquiry” as explained by Schon’s foreward (Torbert, 1991). Action inquiry seems to be a method to help people learn how they might improve their work performance, and their practices. Torbert differentiates between action inquiry and action science, suggesting “it represents a paradigm change as significant as the change from medieval theology to modern natural science” (Torbert, 1991). A vital aspect of action inquiry strives to provide the participant with more effective ways of observation, reducing bias, and skewed perceptions. In this work, the fact that client team members

participating in interventions were sought to be enriched, seem to support the proximity of action inquiry and action science.

- **Participatory action research (PAR)**

PAR seem to be interchangeably used for action research itself, however, PAR seeks to establish and stimulate dialogue, usually organised through projects and intertwines both research and action. Essentially the two types of PAR include:

(i) the social action perspective in sociological thinking (Bendix,1963, Parsons, 1964; Whyte, 1959; 1989; 1991a; 1991b).

(ii) the conscientisation perspective in educational thinking, such as Freire (Heaney, 1995).

The PAR process suggest that members of the organisations under study are to participate in the process "from project design through data gathering, analysis, and report writing, on to the implementation of conclusions emerging from the research" (Whyte, 1991a, p.273). PAR work by Borda and Rahman present a variation with strong links to the education embedded model of Freire (Borda and Rahman, 1991). Aspects of PAR can be observed in this work as it requires constant collaboration during interventions, between both client and designer/firm team members.

- **learning history**

Learning history as an action research model is quite new, and designed to deepen the learning from innovative groups and facilitate the diffusion of learning to other groups and organisations (Roth & Bradbury, 2008). Roth

and Kleiner at MIT's Society for Organisational Learning coined the term "learning history" in studying how highly performing teams may be assessed and used for training other teams (Roth and Kleiner 1998). Hilary Bradbury took this notion further at the Swedish non-governmental organisation, The Natural Step (Bradbury, 2001). Importantly, learning history is a story-based approach that includes the messiness of human endeavour, whilst the potential for learning from other's experiences and contexts are retained. The potential for learning in any situation is increased if one has access to the "thinking, experimentation and arguments of those who have encountered the same situation" (Roth and Kleiner 1998), which is a departure from the distilled best-practice that imply change to be mechanistically executed cause and effect.

4.2.2 Aspects of the action-oriented research affecting this work

The above review of action-oriented research present the diversity of models and methodological approaches, however current debates relate to the common interest in variously categorising, re-interpreting, deconstructing, modifying, extending, curbing, or even rejecting what the advocates of action research view as the "normal or traditional" approach to research, much of which stem from the following themes:

(i) nature and problems of "normal" research (Whyte, 1991b; Winter, 1987; Cooperrider and Srivastva, 1987; Rothman, 1972; Sanford, 1970);

(ii) nature of the alternatives proposed (Schön, 1983; Hult and Lennung, 1980; Argyris and Schön, 1974; 1991);

(iii) difficulties associated with the alternatives (Checkland and Holwell, 1998b; Moser, 1996; Robinson, 1993; Rapoport, 1970; Blum, 1955);

(iv) ways of dealing with these difficulties (McCutcheon and Jung, 1990; Peters and Robinson, 1984; Bartunek, 1983; Susman and Evered, 1978);

(v) future directions of action-oriented research (Joosten, 1996; van der Kamp, 1996; Zuber-Skerritt, 1996).

The essence of the varying comments on action research, point to the notion that methods of "normal" research are not suitable for the domains of action. Quantitative literature and research promotes a maximum and deliberate distancing from the world of action (interference; unbiased observer), making it difficult for such researchers, to study systems or issues which call for some type of active participation e.g., challenges in education, social welfare, criminology, and public health (Sanford, 1970; van der Kamp, 1996). It has also been argued that a separation between research and action could produce stable and quality results under certain conditions, but the results might not be utilised by the intended target audience (e.g., Friedlander, 1984). The conventional approach when applied on humans is said to be methodologically erroneous while also unethical (Argyris & Schön, 1974; 1991; Reason 1994b). In summary, it appears that action research constitutes a kind of science with a different

epistemology that produces a different kind of knowledge, a knowledge which is contingent on the particular situation, and which develops the capacity of the members of the organisation to solve their own problems (Susman and Evered, 1978). It appears that this body of work in a number of ways has experienced these opinions and junctures in the development of the prototype. The key thread that this work uses in its favour, relates to the cyclical, iterative and reflective techniques espoused in the body of action-oriented research.

4.2.3 Action oriented research aspects applied to this work

As noted in the previous sections there are a number of action oriented techniques this research draws from, and to claim strict adherence to a specific method seem difficult. As an example, the research takes a leaf from ***Action Learning*** whereby group problem solving are directed and aligned to management learning and development, since all interventions involve groups of people (client and firm staff) attempting to improve a situation (desired project outcomes).

It relies upon ***Action Science*** in the sense that free and open enquiry are required in a client environment, which include reflection of the way things are done, reflected in executing interventions for clients, by grounding the project intervention in the prototype's model linkages to its sub-systems. The interventions also provide a way for people to learn how to improve their work, drawing support from ***Action Inquiry***. All project interventions undertaken, require client agents to participate across the invention

activities (data collection, analysis, and reporting), linking it to ***Participative Action Research***. The ***Learning Histories*** model, where innovations are transferred to other groups, is also a clear aspect sought for in interventions (e.g. the document repository, process integration maps and related support documents provided to clients, post implementation). These aspects are laid bare to reveal my difficulty in separating the clear boundaries of action based typology, and serves to link the essence of the family of action oriented research, to the common thread that this work relies upon, i.e. the cyclical iterations of Plan, Act, Observe, Learn, and Improve (Carr & Kemmis, 1986), and links to Checkland's Reflective Practice Development, and perhaps much more directly to the work of Hoebeke (2000), who notes that the only way agents and agencies can improve, is by being able to improve the manner in which they relate to being part of variously constructed self-regulating networks of relations. This view mirrors the finding of this research as well, whereby during interventions undertaken, clients often question or refuse to look beyond their very rigid views of organisation, its perceived boundaries, and find it very difficult to relate to systemic networks or extended value chains (EVC's).

Carr and Kemmis (1986) serves up three core reasons for the differences in action research approaches, this being Technical research – where practitioners test external research in their own practices in order to feed new findings into the external research; Practical research – emphasising practioners themselves, where the conduct and outcome of research,

enhances the reasoning of practitioners via external facilitator cooperation; Emancipative research – takes responsibility for the development of practice, understandings, and contexts in an integrated and interactive process. Car and Kemmis notes that emancipatory research leads to “take responsibility for its own emancipation from the dictates of irrationality, injustice, alienation and unfilfullment” (Carr & Kemmis, 1986), which strongly resonates with the approach for this work.

4.2.4 Research techniques applied

The positivist methods of the natural sciences have provided the benchmark for what constitutes “proper” research for the last 50 odd years. It proposes some form of “received view” which dominated formal discourse in physical and social sciences for some 400 years (Guba, 1994). This paradigm proposes an “apprehendable reality” driven by immutable natural laws and mechanisms, which can be discovered using appropriate research tools (Burns, 1994; Fay, 1987), where researchers are able to act as neutral observer, who are then able to manipulate and control contexts in order to discover general laws and rules. Stress is put upon “validity” and the apparent elimination of bias and subjectivity.

The ability to claim impartiality and be an absolute unbiased observer has been challenged and probably sealed as an argument in the recent Quantum Mechanical experiments regarding quantum entanglement. The emergence of post-positivism, which is a revised version of positivism, sets

out to falsify rather than verify hypotheses and recognises that only flawed versions of reality can be identified. Objectivity remains prized, with less stress upon manipulation and control, having inquiry in natural settings by collecting situational information (Guba, 1994), with the researcher remaining an outsider, who seeks to obtain generalisable findings. The third research paradigm identified by Guba and Lincoln, is Critical theory, which recognises the fluid nature of life processes and how our reality is formed by social, political, cultural, economic, ethnic and gender factors. It takes these constructs as "real" for all practical purposes. The position of the researcher is one of being interactively interlinked to those being studied with no suggestion of neutrality or objectivity, with an emphasis is on dialogue (Freire, 1972; Giroux, 1988), aiming "to uncover and excavate those forms of historical and subjugated knowledges that point to experiences of suffering, conflict, and collective struggle" (Giroux, 1988). This is also the theoretical paradigm that suits this work and my perspective, which draw support from thinkers such as Bourdieu and Fouccalt in a number of important ways (e.g. Bourdieu's notion of Habitus, fields of Capital; Fouccalt's view of how Power works in local contexts).

4.2.5 Research methods used

Action research uses a range of methods in pursuit of its transformatory aims, of which some may be unorthodox (Reason, 1994), covering storytelling, sociodrama, plays, skits, puppetry, song, drawing and painting as ways of gathering data that cannot be obtained by more orthodox

methods (see also Lomax and Parker, 1995; McNiff, Lomax and Whitehead, 1996, quoted in Zeichner and Noffke, 1998). This diversity of data gathering methods have significance in this context whereby interventions allowed for ***interviews***, ***researching client documentation and performance data***; understanding the ***culture*** of the organisation and its staff. This fits into Reason's view that "the perspective of the community is often an important source of people's knowledge and empowerment (Reason, 1994). Furthermore, evidence methods used for this research can be described as traditional or orthodox, although sourced variously. The use of ***multiple sources*** (Burns, 1994; Dick, 1995) that serves to converge and assist in establishing the credibility of research findings are relied upon. ***Structured interviews*** with key staff of clients during interventions, as well as ***documented and recorded minutes*** provide for reliable foundational data and evidence (Bogdan & Biklen, 1992; Burns, 1994; Wadsworth, 1984). Additionally, the many and more common "***unstructured interviews***" resulting from inpromptu meetings and exchanges between client agent participants were seen as being key ***informants*** (Taylor & Bogdan, 1984). Furthermore, as a key step in the assessment phase of interventions, the "***analysis of documents***" from historical archives (Janesick, 1994; Wadsworth, 1984), provided additional sense and perspective.

All of these offer a broad and inclusive view of how client institutions function and how it came to be the way it is (Middleton & May, 1997). I have verified with intervention or project team members (informants) that

my interpretation of the different interview material (minutes, memo's, documents), reflect the discussions, whilst being acutely aware of the constraints that may prevent them from challenging this (McWilliam, 1994; Wadsworth, 1994). More detailed description of these methods follow, where consideration and critique of interview techniques are made clear. Importantly, documentary selection and analysis are explained, including strengths and weaknesses of "insider status" and "in from outside perspective", encountered in this study.

4.2.5.1 Interviews

Interviews in respect of project interventions are made easier in the sense that session are almost seen as compulsory by both parties (client and firm agents, which include the researcher as team member). The purpose of the interviews are directed at client understanding of the challenges of the intervention, which are usually different from the understanding contained in Terms of Reference documents published by clients in their calls for open or public tenders. The intervention interviews and meetings are therefore vital to obtain a deeper and wider understanding, prior to developing solutions. In a number of instances, the apparent "powers" of the client as paymaster, are asserted in the early parts of interventions, whilst dissipating during the course of the intervention. Usually once client team members have confidence in the intervention team regarding their ideas, plans, and implementation, client team members tend to reveal information more readily, and with much less prompting. In some instances

where interventions are under high degrees of time pressure with extreme lack of support and skill, then it appears that data are easily extracted and readily provided by client team members. Other instances relate to senior managers of the client domain withholding information, or perhaps more accurately, provide curt and often inadequate information and answers to questions, resisting any temptation to reveal deeper and underlying historical perspectives. It may be construed that providing the vendor (firm's team) with too much intelligence, would weaken their own power position and lead to vendor team members claiming this knowledge as their own and for their own use (Jones, 1992). Interviews and interaction with client staff are carefully documented and circulated for comment and refinement to team members first, before logging it as public documents, usually in the form of project minutes or memoranda.

4.2.5.2 Document analysis

Sound research requires validation and justification of claims by referring to specific evidence, of which a common criterion for social science research is that of triangulation (Denzin, 1978; Maanen, 1983). A criterion relevant to this study is the use of a variety of data sources in a study, which in this instance cover ***interviews, document analysis, insider involvement, literature reviews, and research***. Triangulation use multiple perspectives to interpret a single set of data (Janesick, 1994), featuring in this work by virtue of: the intervention team (client and firm members) jointly building robust solutions; the action oriented literature;

and retaining sufficient reflexivity as a practitioner. Richardson's (1994) wider view of triangulation include the notion of "crystallisation", a post-modernist perspective of seeing things from various perspectives, and deconstructs the traditional idea of "validity" (feel there is no single truth; how socio-cultural texts validate themselves). This is like Bourdieu's doxic attitude where we are to guard against what is deemed unquestionable knowledge and fact, echoed by Richardson (1994), suggesting that post-modernism is "the *doubt* that any method or theory, discourse or genre, tradition or novelty, has a universal and general claim as the "right" or the privileged form of authoritative knowledge". Traditional notions of validity, therefore, are disputed (Lather, 1986; Lincoln & Denzin, 1994; Richardson, 1994). For this research, the validity of the approach and data should be judged by the levels of consistency across interventions; specific procedures used; validating respondent perspectives (clients that need to sign-off and sanction intervention plans); and the consistency of the various sources used (public and government documents).

Typical issues encountered in review of documents, often touch upon having to understand previous intervention thinking, documents and logic, which is made difficult due to having limited access to the document originators (e.g. being written and prepared by consultants no longer available; or prepared by client staff that may have resigned or moved). For an action researcher, particularly operating from an emancipatory perspective suggests an insider role. From the beginning, I was committed

and remained positioned as a researcher/designer who created the firm, whose project interventions secured via public tendering, created the client/s, forming the "2 worlds of the client and designer". The "world of the designer" covering the firm's operations, marketing, sales and general performance of staff. The latter suggest an "in from the outside role", whilst the former suggest an "insider" role. The dual "world of application" provided a unique advantage of coming "in from the outside" when studying client interventions; whilst being an insider when dealing with studies that touched upon the firm's operations. The credibility relates to "connecting patterns" (Bateson, 1979) noted in Chapter 1; having had extensive experience; being in an appropriate position to carry out the research; advising and developing people and the trustworthiness implicit in such roles; the hope of being perceived as being capable to carry out the research with integrity and honesty; commitment to my own context and personal interest in it's success; and lastly familiarity with my research context and SA's developmental challenges.

A constant doxic and reflexive attitude was sought to be maintained at all times by virtue of the research taking precedence above any other potential and actual underlying motives, like profit or power positions. I am hopeful that this will be evident from the research cycles in terms of themes and patterns that include my own fears, doubts, shortcomings and misgivings. This reflexivity ties into ethical issues as well, such as for example where quantitative research tends toward "researcher knows best" (Lincoln & Guba, 1985) and when "researchers interact with

participants to understand their social construction" (Lincoln & Guba, 1985). It is thus vital in research such as this, for the researcher to ensure that this social construction, and related world views are not misconstrued, nor abused to the detriment of the work, which is also why in Chapter 1 (problem formulation and context), the potential influence of my own Habitus are cited and noted.

CHAPTER 5: PRACTICE – development of the prototype via action research cycles.

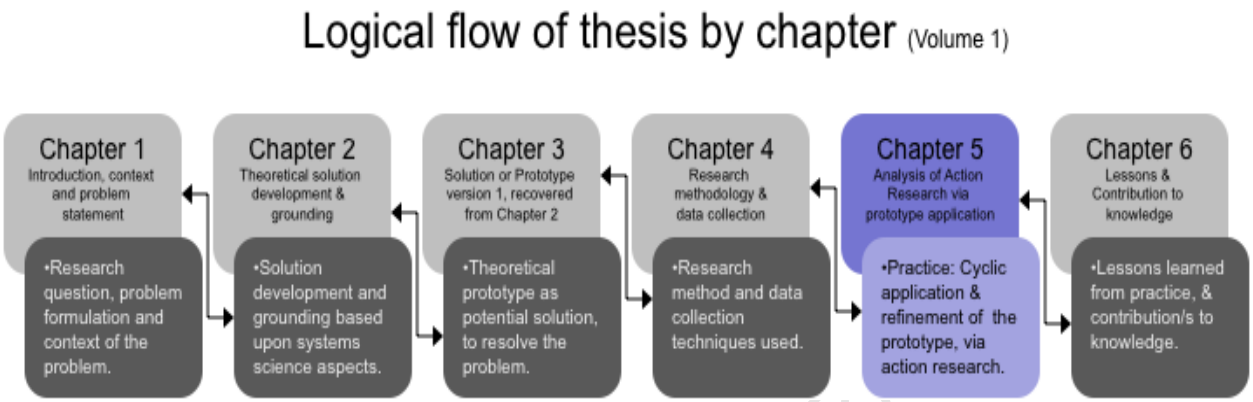


Figure A.5: Repeat of figure A, highlighting chapter specific focus and content

Flowing from Chapter 4, and connecting to this chapter, relies on Checkland's explication of Reflective Systems Development and how intellectual frameworks are used in relation to application areas (Checkland et al, 1990).

	Research	Practice
Purpose	To develop knowledge; To understand, support & improve practice as part of ongoing professional development	To develop tools as part of the ongoing transformation or organisations & society
Framework	Dialectics Reference disciplines	Systems development theory & methodology
Process	Action research	Reflection-in-action

Figure 5.1: Table showing Reflective systems development as an approach to research and practice (adapted from Checkland et al, 1990).

Figure 5.1 highlight the proximity of research and practice, and how these two areas support each other, similarly supported by Vidgen et al. (1997), in Figure 5.2 below, relating the different purposes of research to different types of activities, where understanding is based on interpretations of practice, whilst supporting practice, where we simplify and generalise interpretations and engage in design of normative propositions or artifacts (e.g. guidelines, standards, methods, techniques, and tools). We proceed to change and improve practices through different forms of social and technical intervention.

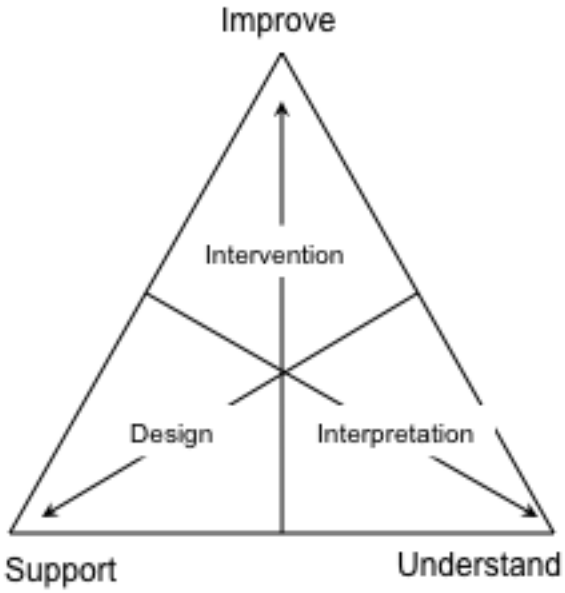


Figure 5.2: Research goals and activities involved in Reflective Systems Development (adapted from Vidgen et al., 1997)

The triangulation represents the unity of the three goals, and illustrate how each of the activities benefit from the other (i.e., a deeper understanding of practice is created when we change it, for say greater efficiency).

Therefore, the propositions and our interpretations of practice are used as part of intervention strategies to improve practice.

Added to this are Schon's studies on how professionals think in action (1983, 1987), revealing deeper appreciation of the role of knowledge and the relation between research and practice in systems development, arguing that traditional conception of knowledge is insufficient to explain how professionals (engineers, managers, architects, city planners, etc) deal with problematic situations in practice, i.e., traditional knowledge is based on technical rationality, whilst he suggests professional activity consists of instrumental problem solving based on rigorous application of specialised scientific theories and techniques, implying a hierarchical view of professional knowledge in which general principles and theories occupy the highest level and concrete problem solving the lowest (Schon, 1983).

He proposes reflection-in-action, which explicitly addresses how professionals deal with problematic situations involving complexity, uncertainty, instability, uniqueness, and value-conflict. This form of knowing-in-action describe how we reflect on our actions and, in some cases, reflect-in-action, a disposition retained thoughout this body of work.

5.1 Process of prototype development

This section present the practice and application of the prototype, across various interventions, yielding insights and lessons to enhance and improve the prototype.

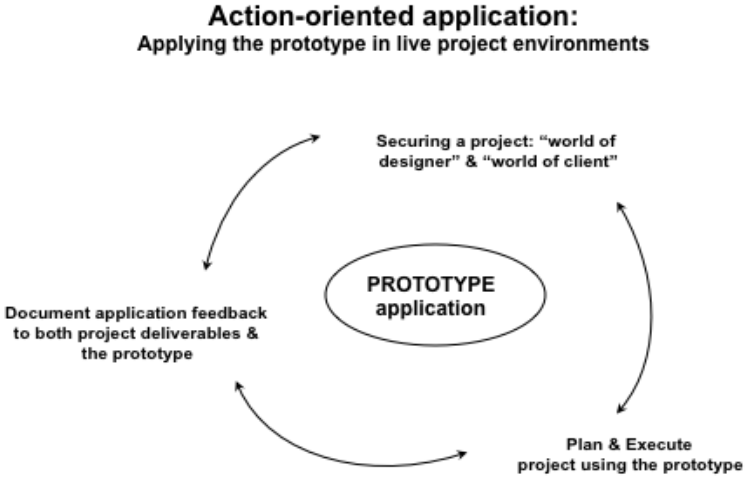


Figure 5.3: Action research application goals

Figure 5.3 puts into perspective the aims of improving both, intervention outcomes (project mandates), and improvements in the proposed prototype itself (BAT). The application to interventions cover two different areas as noted: "***the world of the designer***", meaning Internal projects, covering the operational management of the firm; and "***the "world of the client***", which implies external projects undertaken by the firm in its mandated duties from various clients.

The nature and extent of the application differs significantly, as it is directly impacted by project specific requirements, which are in keeping with the test objectives highlighted in figure 5.4 below.

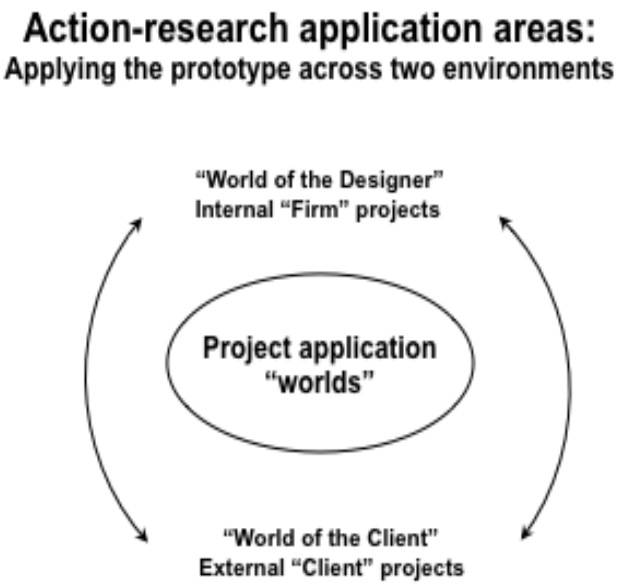


Figure 5.4: Dual application areas of the the prototype

Lessons across the "***2 worlds***" provided insights and improvements for both intervention outcomes, and the prototype (versions of BAT 1,2,3), as depicted by figure 5.5 below.

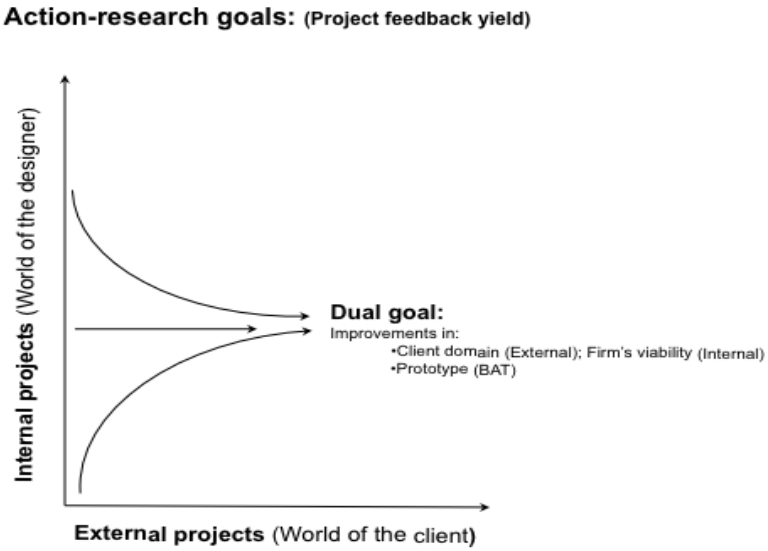


Figure 5.5: Application goals via action-research

The unified outcome derived from the "2 world'" application areas expressed in figure 5.5 above, have been repeated below for ease of

reference, using a combination of the application goals, and the overall research goals.

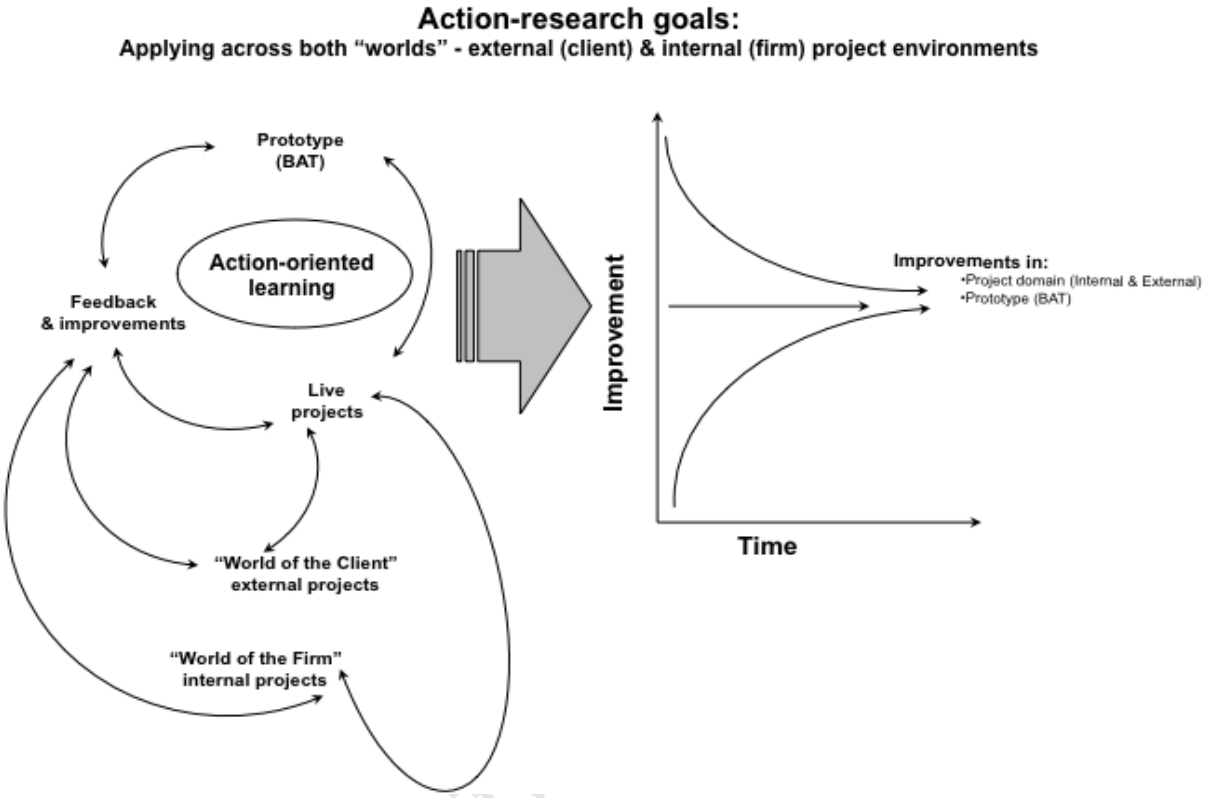


Figure 5.6: Overall action research goals in context of the worlds of application

At the risk of being repetitive, the combined relevance diagram, figure 5.6 seeks to tie the overall research methodology and goals, to the application through the three action research cycles, categorised under the 2 "worlds" of:

(i) "**The world of the Client**" – meaning external, client projects or interventions;

(ii) "**The world of the designer**" – meaning internal operations of the firm;

5.1.1 Interconnectedness of the application test-beds

The 2 areas of application are interdependant and complementary, i.e. to grow a business or a competence inherently requires that whatever is being “sold”, “built” or “implemented”, does actually provide some intrinsic value to the buyer. Failure to provide this “value-add” may lead to having a project or two, but may not result in building a sustainable business.

Thus excellence at project delivery level, invariably results in growing a core competence, and eventually a brand.

The projects that follow are of the larger or longer duration project samples taken from the 70 applications; the graph below highlights these, and the time periods attached to each.

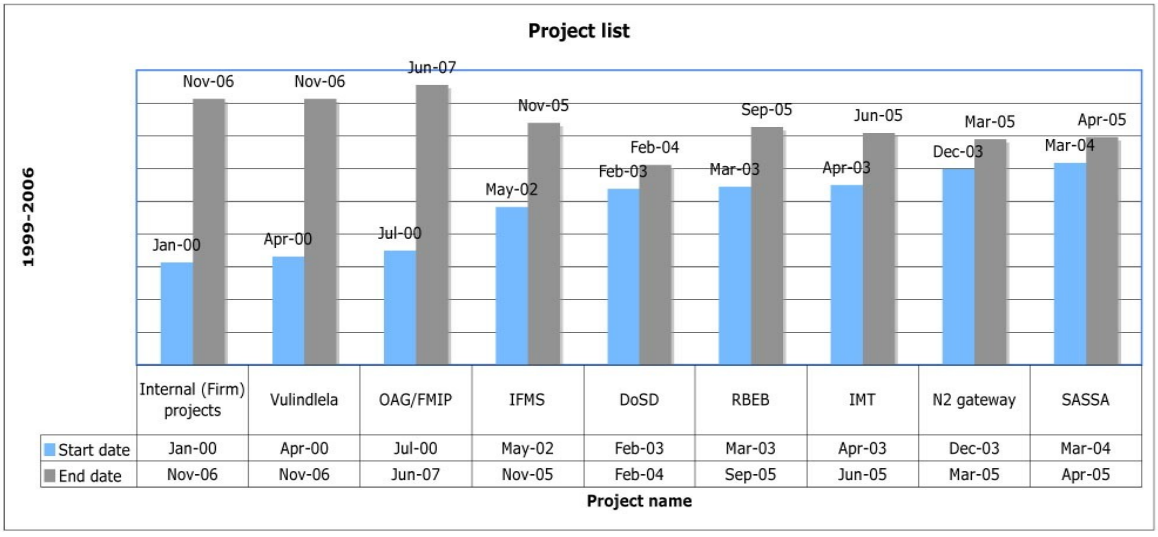


Figure 5.7:Project list with start and end dates per project

These projects have been highlighted due to their extended periods and respective complexities, with the action research cycles being reviewed at each 18 to 24 month periods (i.e., action research cycle-1 took projects

covering the first period, with action research cycle-2, continuing from that point, through to cycle-3). Some projects extend across all three cycles, with Figure 5.8 below explains this scenario by taking the projects shown in Figure 5.7, and adding the action research periods, 1, 2 and 3.

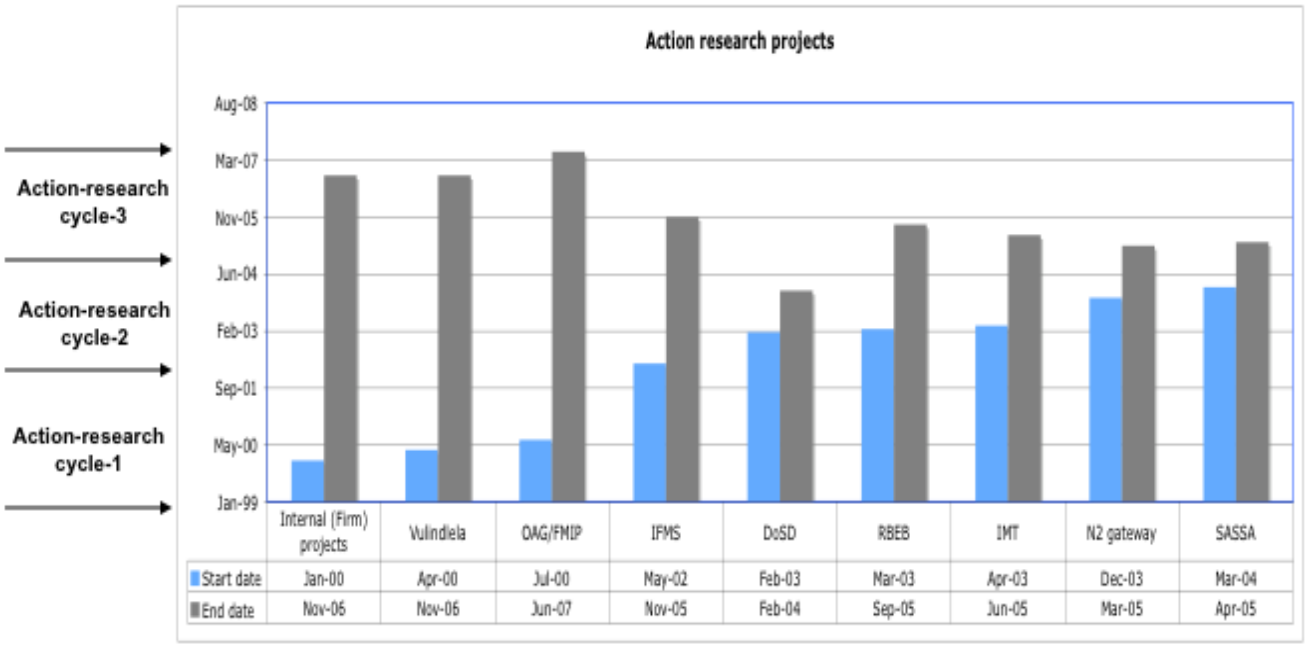


Figure 5.8: Action research cycles, across the various projects and related time-lines

As figure 5.8 explains: Action research cycle-1 broadly covers the period between June 1999 to September 2001; with Action research cyle-2 covering projects from September 2001 to June 2004. Action research cycle-3 proceeds from June 2004 to November 2006. The intervention or projects start and end dates that coincided with these periods, were consequently dealt with in terms of the particular research cycle.

The development and improvements of the prototype over the research cycles 1 to 3 refer to the deeper levels of resolution regarding content. The diagram below (Figure 5.9) depicts this through the cycles of iteration, reflection, and resultant changes to the prototype (BAT), per action research cycle.

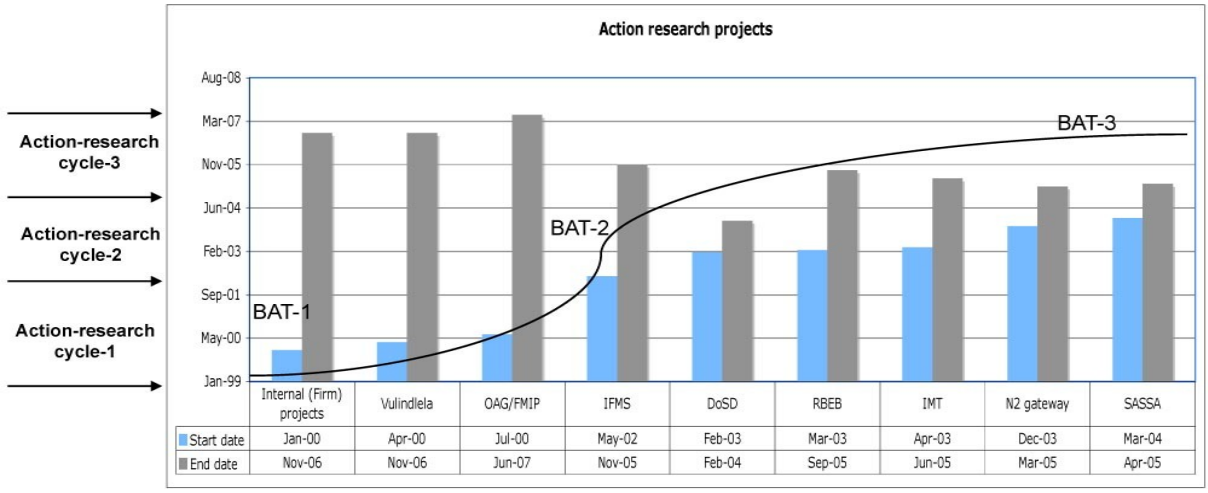


Figure 5.9: Development of the prototype (BAT-1; BAT-2; BAT-3), across the action research cycles

Being immersed within, and forming a small part of the socio-economic dynamic described, generates a great of pressure both from a client viewpoint (always under delivery pressure; inability to meet deadlines; frequent cancellation of meetings; and an inability to lead amidst reform process); as well as from an internal firm viewpoint (funding; access to expert systems theory resources; research and development). In this context, the establishment of the firm itself was an integral part of the research work, i.e., as researcher/designer to setup an organisation whereby, from the inception, there had been a deliberate attempt to apply

and adhere to using systems and complexity-based management techniques across the business itself and the projects undertaken by it. From the perspective of the "world of the designer" – considerations regarding the viability and operations of the firm were: Back-office support; Relevant product/service; Sales and Marketing, and Resource capacity. These parameters are seen as being sub-components of an integrated higher-level of resolution, i.e., system-in-focus being revenue generation for the firm, for sustainability. The diagram below depicts this in context, i.e. the firm's survival, value, and revenue generation capability.

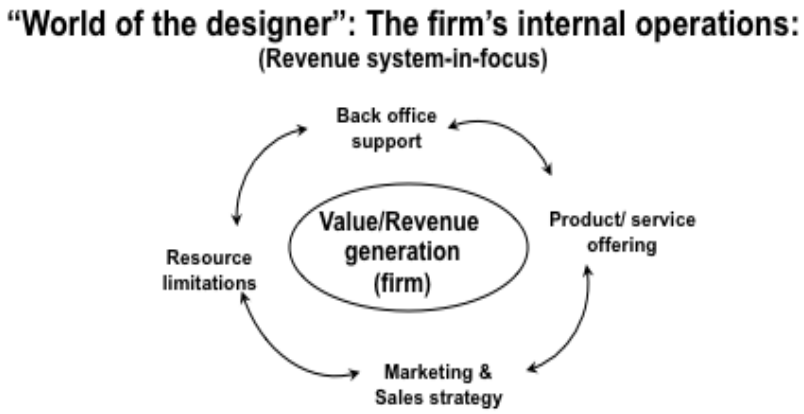


Figure 5.10: Internal operations of the firm as a "system-in-focus"

Figure 5.10 alludes to key integrated sub-systems having a meaningful impact upon the creation of value, and importantly highlights the interconnectedness of the "2-Worlds". The logic for these have been summarised hereunder, with an important aspect relating to reviews and insights by staff and partner members of the firm providing feedback across internal and external projects.

Resource limitations – the limitation or access to resources (like funding, expert skills) have a direct impact on the creation of revenue, and as such has been included as a vital sub-system parameter under the "world of the designer";

Product/Service offering – as with any sales event, there must be a product or a service that the market is willing to buy. This aspect represented the opportunity of offering the prototype, as an integrating tool, serving as a unique value proposition by the firm. The general lack of sound and effective management expertise and experienced resources within the country, presented a landscape with good opportunities for "consulting, advisory and coaching type tools and services";

Back office support – this sub-system is a vital support mechanism in any business, and represents the various support functions that are required in order to manage the business within acceptable quality and governance limits (e.g., Billing; Invoicing; Legal; Regulatory requirements; and management). All of these functions must therefore be planned for in order to meet minimal standards.

Marketing and Sales strategy – this sub-system makes reference to how the product or service is sold and positioned in the minds of potential clients, and include taking into account all traditional marketing and sales aspects. This was done with a key difference, in that the approach had been infused with specific complexity concepts such as: self-regulation (to observe how the agents within the firm itself manage and arrange themselves, having little to no prescriptions and oversight); emergence

(essentially seen as a bottom-up approach whereby agents within the firm were allowed to pursue their own paths in terms of revenue creation and basic management objectives); Uncertainty (the dynamic and probabilistic nature of social systems and complex adaptive systems requires a capacity to deal with unpredictability); and attractors in the landscape (which makes reference to specific conditions which exist in the SA context such as affirmative action, and innovation). The firm was a key area for the testing of specific complexity constructs, with feedback covered further in this chapter, suggesting that for agents and agencies to adopt notions of self-regulation, and allow for emergent properties to manifest, require, as a minimum, some formal understanding of systems. The results indicate a propensity to discuss and theorise by agents, but are severely lacking in practice or implementing these notions in their daily routine activities, suggesting a strong appeal at a philosophical and academic level, but not transferred into daily practices of agents. The inability of agents and agencies to appreciate the implication of real life dynamics regarding control and prediction is also laid bare, whilst notions of attractors with the environment suggest that these two constructs may offer insights relating to unpredictability in a different, less daunting manner. The above parameters form the basis of the elements that had been focused upon in terms of the “world of the designer”, representing a departure from the manner in which client projects had been documented and measured. The author believes this deviation to be of material nature as it implies using the framework in a different context. The intent of the deviation was

directed at improvement of the prototype, with applications focusing upon revenue generation, marketing, and sales. The deviation, introduces additional complexity concepts into the overall strategy if the firm, typically observing how notions of *Attractors, Emergence* and *Uncertainty* impact the firm's viability. The extent of how the firm and it's team members dealt with these challenges, being the focus of the review. The manner in which these notions were tested relates to the following: Self-regulation, whereby senior managers were provided the resources; the overall strategic plan; and the targets based upon this planning, in order to help create a viable firm. How firm members were to arrange themselves and the detail of how they both pursue and attain the desired outcomes, were left entirely to their own discretion. Observation and reflection related to how the team regulate themselves, and the emerging patterns based upon such unregulated "freedoms". The only requirement was to create a weekly management platform wherein progress was shared between team members. The notion of attenuation was infused into the sales and revenue generation sub-system, whereby managers were asked to note and observe how attractors in the landscape, impact their ideas, plans and actions in this regard. The attenuation or filtration in this sense was to sensitise team members of systemic insights and how very specific attractors like "empowerment"; and "innovation" in the environment could be used more effectively regarding their business development efforts for the firm. As an example, the legislative requirements of black economic empowerment can be seen as either an opportunity-laden, or very threatening attractor,

especially if interpreted in a mechanistic manner. Local examples abound whereby organisations hurriedly brought on board BEE partners in order to ensure legal compliance; others chose a strategy whereby they partnered smaller BEE firms for compliance, so as to ensure their viability. When adopting a systemic position, it however does not prescribe what decision to take, but highlights the potential consequences that each decision may bring with it, which appreciates the probabilistic nature of socio-economic systems and the inherent unpredictable nature of dynamic landscapes. Thus whilst unpredictability is everywhere, observing systemic potentialities, ensure alertness to maters that may arise in future, which build the capacity to anticipate and react faster.

The results from the practice in this regard is difficult to interpret, but as the observer the approach remain invaluable as it provided insights like: an improved predictive capacity in terms of anticipating performance of managers, especially in terms of attaining revenue targets; and the abuse of self-regulation when handed to insufficiently equipped agents. The growth in terms of understanding from all managers within the firm was also impressive, but the lack of implementing these, remained absent. The fact that the operational context of the firm was strongly oriented to learning with no pressure on managers regarding revenue and sales generation, may also have contributed to the lack of attaining revenue targets. Based upon these reflections it would appear that a learning environment alone is insufficient, and that agents require formal systems

background for notions of self-regulation to make meaningful contributions. As researcher, it could be that the principle of self-regulation may have been taken to the extreme, such as the absence of measurable targets across both learning and revenue creation. Added to this, the capacity of the researcher to provide guidance and leadership to a large team may have also contributed to a negative outcome is this regard. An important lesson of this work, relates to how agents, despite having received coaching, training and direction, regarding systems practices and insights, tend to slip into the pervasive illusion of predictability embedded in their respective mechanical orientations. This is especially true when agents were faced with implementing as opposed to discussing these matters.

5.2 Insights and knowledge gained via the Action Research Cycles

5.2.1 Action research cycle 1

5.2.1.1 Vulindlela

Overview

The project entailed the re-design, delivery and maintenance of a national data-warehouse for the Department of National Treasury, responsible for the policy and management of the national budget and related monetary and fiscal planning. Government's national budget and financial performance, being informed through this project, and based upon the cost of capital (issuing of government bonds to raise money on local and international financial markets), a core target was ensuring more reliable data, to reduce the cost of National borrowings. The project was managed by one of South Africa's largest information technology organisations. Our mandate was as a "sub-contractor" to assist the primary vendor in improving the reporting and statistical accuracy of the budgeting models (budget forecasts and expenditures by the various departments did not enjoy a great deal of correlation, hence the need to develop more accurate data for efficient lending and the issuing of national "RSA" bonds).

Application

Our mandate was very specific, requiring only one team member (statistician) to be part of the project, which at the time had a total project team compliment of fifteen members, being mostly software engineers. After a few months of developing and evaluating alternate statistical models, it became clear that the problem was not in the models that were developed, but in the data itself. The historical budgeting and expenditure data did not provide any form of intelligible use even after much screening, scrubbing and filtering techniques had been applied. The firm's report suggested the problems of the large inaccuracies and variations to be part of a bigger problem in terms of data integrity, data accuracy, capturing and reporting of data. Furthermore, it appear that the manner in which the project team had arranged themselves to respond to the project, i.e., the software engineers, however good, did not have a clear understanding of the user requirements, thus compounding problems, leading to the suggesting that the project adopt a different strategy.

The prototype planning promoted a more integrative view, suggesting changes across the strategic, tactical and operational architecture of the intervention itself. The inference at this juncture being that the current intervention was embedded in the definition of a misdirected problem statement, requiring re-alignment to reflect this new and deeper understanding. The report was not well received by the client and especially by the primary contractor, since by implication, the project

approach, had not been well thought through, despite having spent four years running the project to this point. Subsequent to the report, a number of meetings and workshops were called to explain the content and recommendations in detail. Key in the recommendations based upon the prototype planning were:

Strategic architecture – the problems identified with the vision and strategic objectives of the project indicated little, to no regard of infusing it to the actual project structure, typically, the minimal integration from the strategic level to the tactical level indicated poor problem definition and planning at project initiation. Some of the key reasons for the problem revolved around matters such as: Limited consultation with the user-community of the solution, with the result that the design parameters contained many assumptions that were erroneous (e.g., how the officials prepare their budgets; expenditure timings). An additional problem area surfaced via the strategic architecture revealing a lack of understanding budgeting and forecasting itself at user community level. This supports the notion of weak problem statements and the need to plan interventions in consultation with client agents, so as to improve understanding (e.g. Pre-active planning by Ackoff; Design ratoinale from Rittel and Kunz; Hoebeke's transformational process), before designing any solution. It also gives insight into practical wicked-type problems whereby, would-be interveners, may compound the problem when adopting linear planning techniques. The Technology service provider were "throwing" technology software and engineers at the problem, assuming that all else is fine,

essentially a Systems Analysis perspective to resolve a systemic problem. This stance make implicit assumptions that the data being provided by thousands of State employes are consistent, accurate and conforms to some standard. This directed the prototype solution to incorporate a strong element of training for officials (some 15000 finance related officials had been identified in the report). Importantly, the strategic architecture revealed the extent of the problem faced by the project (change management issues, choice of software, lack of financial and budgeting expertise, training needs, weakly defined processes, and capacity shortcommings relating to budgeting and financial officials across the country).

Tactical architecture –these findings were the most difficult to accept by the contractor, as it highlighted the errors in the choice of skills on the project (only software engineers). The project composition and initial approach assumed the client needs to be predominantly of a software nature, with very little thought given to other needs (process issues, people issues and integration aspects). The revised tactical architecture required the current team to be supported with additional expertise, covering integration, business analysts, process experts and training expertise. A vital tactical architecture recommendation concerned the software choices made (applications in use were very expensive, with important modules of the software being untested). The overall technical design also required attention, due to its limited robustness and design choices favoring

parameters of a data-mart (small scale data and system requirements), as opposed to a data-warehouse reporting on the financial statistics of a country (large in scale and complexity).

Operational architecture – the current team members assigned to the project were sufficiently competent and proficient, but required additional expertise extending beyond software engineers. The new operational structure proposed integrating additional work-streams into a much larger programme, doubling the size of the project team.

5.2.1.2 The Office of the Accountant General (OAG)

Overview

The Office of the Accountant General is a department requiring a great deal of extremely sensitive and important work. Prior to 1994, the government's accounting was still executed and managed in terms of an outdated model, called the Exchequer's Act. The criticism against this model was that it was a "cash" basis of accounting, which allowed by default, a number of inconsistencies, having insufficient governance parameters and transparency. The emergence of South Africa into the global economy, required much changes and improvements, one such improvement related to the migration from a cash to an accrual basis of accounting. The importance of this intent is reflected in the ratings of the country as an investment destination as well as the ability to show

transparent governance proceses relating to accounting standards and protocols. The Office of the Accountant General is mandated to ensure these reforms are enabled and implemented, the Act of Parliament being the Public Finance Management Act (PFMA), and the implementation programme was called the Financial Management Implementation Programme (FMIP). The OAG's mandate is to ensure that accounting standards, policies, guidelines and systems are in place to support all the national and provincial departments, hence a formidable and complex responsibility.

Application

The project mandate was to assist the OAG in terms of developing the strategy, and the overall programme of intervention for the implementation of the PFMA. The major constraint in this assignment was the lack of internal official capacity. The OAG's structure had a vacancy of seventy (70) staff, effectively having only two (2) officials at the time of project initiation, this being the Accountant General himself, and his personal assistant. An ad-hoc requirement to our project mandate was to assist with the immediate and urgent issues that needed to be addressed, such as setting up and constituting the Accounting Standards Board (ASB), among other official support functions, whilst developing the strategy and programme of implementation. The prototype-based planning can be summarised as follows:

Strategic architecture – since few counties have embarked upon such aggressive financial transformation (at the time the UK, and the Australian governments attempted part implementation of similar reforms), mean little experience and research existed, which limits the strategic understanding of the challenge. Since the policies are to be derived from the new Act, existing policies may need to be revised, with others needing to be repealed, or scrapped. Once a policy is adopted, it becomes prudent to develop detailed guidelines, supporting process maps and business rules. The prototype's problem statement provided a wider and deeper view of the ideal intervention solution, considering implications how the impending changes (financial reform) would impact government's enablers (i.e., all of governments Process, People and Technological enablers), cutting across all departments due to its transversal nature. The extreme urgency of the financial reform, suggested a focus upon the most vital or urgent policies as a short-term objective, get these out for comment, refine the polices based upon the comments, and thus "creating" time to focus upon policies that were less urgent. To assist in the fast tracking of the policy development, part of the plan included the establishment of the Accounting Standards Board, working with the International Finance Corporation (IFC) and related international bodies. Another aspect to this approach was the creation of the Chief Financial Officer's Forum (CFO forum) in government, geared toward infusing reforms and specialised training to obtain greater support for the overall reform process.

Tactical architecture – the fundamental shift in doing and executing financial functions, have a transversal effect, impacting all enablers: People had to be re-skilled and re-trained; Processes had to be unpacked, understood, refined and made compliant; Technological enablement (IT systems) were to be re-engineered and replaced. The suggested base-line planning created a stir within the department, since just the new software and hardware systems, were estimated at R9 Billion. This caused project delays as it required engagement of multiple stakeholders to explain why, and how we arrived at the programme of implementation, raising discussion at the highest levels in government, to review the decision to move from cash to accrual accounting. However, since government already committed to the reformation process to promote the country's intent for transparent and strong governance (in order to improve international credit rating and standing), turning back was no longer an option. The wider and deeper systemic problem statement suggested very little thinking had been invested into the practical effects of such a bold programme. The prototype planning and implementation assisted in providing the client with a "rich-picture" dynamic, which after being presented and explained, caused consternation.

Operational architecture – the proposed plans for the improvement on the operational architecture was equally large, as it represented a fundamental shift in how all financial cadres in the public sector would be operating in future. Typically it would ideally require appropriately qualified staff; having reliable supporting information technology (IT), as well as

having adequately defined and mapped processes within which to manage and effect finanical controls, particularly so, since public officers were made personally liable in terms of the PFMA, in the event of maladministration. This presented the OAG and government with a dichotomy, i.e. whilst the new Act made officials personally liable, government could not technically enforce this, since such liability assumes that all support relating to the PFMA are in place (i.e., that training has been effected; that clear guidelines were available to officials; and that supporting processes and technology are in place).

In terms of the prototype planning, strategy and programme approach, a key recommendations was to have a strong "cross-functional" team, including project managers, programme managers, process engineers, business analysts and finance and policy experts. Whilst the overall strategy and the project roadmap were agreed upon, the client had denied a key project requirement, relating to the composition of the project team (multiple, non-financial experts). The opinion and view of the department did not recognise the need for the business analysts, and the process subject area specialists of the implementation, and subsequently only approved a few project managers, finance and policy team members. This practice reality invoke research whereby constraints within the environment have a strong impact upon intervention solutions. The dynamics of real life, which in this instance include the lack of variety (structural, procedural and substantive variety), lack of resources, and a client that believed his understanding of the problem (accocunting problem) to be more accurate

and suited to the intervention, presents a coersive relationship that undermines emancipatory efforts. So despite having access to better planning techniques via integrated stakeholder perspectives, consultative and appreciative-type techniques, a user (client) community may still adopt none, or parts of such planning. This creates a governance and ethical challenge in that, despite clients paying for sound advice (consultants and subject area experts), the ideas and plans tabled are often ignored; or plans are radically altered to proceed in a direction that is contrary to the leadership provided.

5.2.1.3 Royal Bafokeng Economic Board (RBEB)

Overview

This project mandate was to assist a newly created organisation (RBEB), with its strategy and to provide interim implementation support for the various projects being planned by the organisation. The organisation is part of the Royal Bafokeng community, who has a partnership with the listed mining houses to extract the platinum reserves from their ancestral land. The key purpose of the RBEB was to develop a strategic plan for the "Bafokeng Nation", called vision 2020, articulating a view that by the year 2020, the community (Kingdom), would be less dependant upon the revenue from their mineral wealth, and instead be enjoying income streams from various other or alternate sources (Tourism, Agriculture, Beneficiation, Sport and Education having been identified). Essentially the

role of the RBEB was thus to stimulate and create socio-economic wellbeing in a very focused and deliberate manner (i.e., local economic development for the Kingdom).

Application

At the time of securing this project, the client (RBEB) had been established for about 18 months, and as a result had invested extensively into planning, and projects they were to execute as part of their duties. Our entry into the project started with revisiting their strategy, as well as to partly assist and refine their project execution (delivery model).

Strategic architecture – the work and time invested into the process prior to our participation, reflected sound thinking. The key strategic issues unpacked in the planning sessions with the client however revealed small but vital weaknesses in their strategic planning approach. Prototype planning suggested the interpretation of their mandate was misaligned at the higher levels of resolution, i.e., in terms of the organisations vision and mission construct. The bigger concern however, was the consequential development of the strategic objectives and the subsequent goals, milestones and deliverables, comprising the model strategic architecture. If left unattended it may result in continuing on a path of activities which are sub-optimal, compromising delivery efforts of the business as a whole. This aspect was quickly absorbed into the organisation since the leadership (CEO) was acutely aware of the importance of the improved alignment.

Tactical architecture – in reviewing the organisations enabling architecture, a range of issues were surfaced, which were becoming a

common feature across various projects and organisations. The lack of business experience within the client domain, and the importance of taking an integrated view of operations, revealed a fragmented implementation approach (made more difficult with no defined policies, processes, limited standards, various skill levels within the organisation). Our recommendation was to improve upon the integration of the organisation's key enablers, to ensure the investment of effort and resources into the key areas for the right reasons and with better timing (e.g. procuring a document management and financial system, was of lesser importance at this stage, when compared to the immediate value the organisation could extract by re-diverting those resources into better defined polices and business rules that govern the operations).

Operational architecture – because of the misalignment of the strategic and tactical architectures, there had been very little tangible progress over the first 18 months. Much of the projects identified and initiated were well conceived but needed much better management and oversight. This stemmed directly from assuming a very theoretical approach to the business (perhaps arising from the backgrounds of the managers, since most of the senior executives had been recruited from the public sector or non-profit agencies). The traditional mindset therefore being more concerned with managing, as opposed to implementation, which in the case of the RBEB, was indeed a vital requirement (implementation of their various projects).

5.2.1.4 Internal operations of the firm

Overview

The marketing and sales strategy sub-system within the operations of the firm is one of four key sub-systems that touch upon sustainability. The evaluation consequently have a deliberate focus upon Sales and marketing; Attractors in the market; and Aspects of Uncertainty and emergence. The added complexity based constructs such as self-regulation, emergence, and attractors, as mentioned, were additional areas reviewed under “the world of the designer”. These notions are not directly embedded in the BAT, but implied by the boundaries of sub-systems. In terms of the practice of the firm, it was important to observe if such constructs can add value to the operations of the firm, and how it may be possible to plan for such features. The planning for potential impact of the attractors resident in the landscape was done when developing the strategic architecture for the firm, as denoted by the outer oval, being the “system-in-focus” (SiF), having a permeable boundary, to allow information in and out of the SiF, by way of the attenuators between and within sub-systems. The perturbations crossing the boundaries of the SiF, allows to see which external influencing forces, or attractors exists in the external landscape, that are likely to impact the planning and operations of the firm. South Africa, like all landscapes or environments, contain a number of attractors, in this context interpreted as transversal forces within the environment or landscape, having a pervasive socio-economic impact (e.g. such as the issue of Aids). As a start-up business, it was thought prudent

to review the landscape attractors in the SA context to identify key forces that would invariably impact the firm's plans and actions. The attractors deemed vital in context of this work was identified as being: Lack of qualified and experienced human capital; Black economic empowerment (BEE); and Innovation.

Application

Most start-up firms have resource limitations (dedicated support staff for Administration, Back office functions, and Sales). Whilst these constraints are not insurmountable, it does require creativity in managing these all at once. As can be expected, key decisions at this stage of startup relates to short-term goals, cash generation and minimal cost centres, thus typical considerations were:

(i) The mixture and ratio of tenders, proposals, and "cold calls" to be made;

(ii) A strong focus on "low-hanging" fruit (quick sales);

(iii) Multiple role-playing (multiple tasks: Sales; Execution; Administration);

The focus upon these elements were deemed important based upon the thinking expanded upon below.

Sales channel mixture and ratio

This factor was important since it impacted the sales cycle or period. There are effectively two manners, in which a sale can be realised, one being to

respond to requests for proposals (RFP's) published in magazines, newspapers, or bulletins. The other method being, to develop and submit proposals to potential clients (unsolicited bids). Furthermore, having trusted relationships or access to decision makers, usually represent an additional advantage in securing the sale, typically expressed as customer relationship management (CRM). Considerations focused upon which of the two channels presented the higher probability of success, and to focus on that channel, but yet not at the expense of being totally blind to the other less likely channel. The thought processes and review in this regard yielded information that defined the initial sale channel approach. Local market observations suggested the chance of winning an open tender to be unlikely. Apparently, the key reason being the likelihood that the tender was written by, and for either a person or organisation, thereby reducing the probability of success. This issue touch upon governance and the notion of relationships or networks of access to decision makers. Furthermore, the cost of preparing and submitting large tender responses represent a challenge in its own right. Also, the limitation in terms of "branding" is another constraint (being an upstart organisation, competing against established firms with brand names having greater resource capacity).

The better, short-term option was thus to focus on the alternate channel, being the unsolicited bid approach. An additional measure inserted at this juncture was to present the unsolicited bids to potential clients where there

existed some form of relationship, or access point, i.e., a “soft target”. It was believed that this approach would lead to a feasible short-term outcome. Additionally, it did not warrant selling a big “solution”, but rather presented itself as a supporting, “sub-contract” role to firms experiencing capacity problems, thus eliminating the sense of overt competitive positioning. Also, from a budget or cost perspective, the smaller contract values and interventions seemed easier to obtain as opposed to larger, bigger budget contracts, which tend to be award to large international branded firms.

Focus on “low-hanging fruit”

Because of the many limited resources of the firm, it reinforced the importance of spending effort in the right areas, which in this instance, related to sales that can be closed the fastest “low hanging fruit”. This implied that the primary targeted channel identified, needed to be refined, even further in order to be intently searching for organisations or people where the firm enjoyed strong, trusting relationships. The added refinements aimed at better ranking and greater confidence in terms of the probability of a successful sale. Additionally, this approach appeared less intimidating since it hinges upon some known elements (people or organisations with whom we had relationships or previous experience and knowledge), thus providing a greater level of comfort and ease of engagement.

Multiple roles and responsibilities

This aspect specifically relates to the execution of a number of different tasks by the same person/s, implying various roles and responsibilities for an agent. This is akin to the traditional view of entrepreneurship whereby the individual takes responsibility for a number of duties, usually assigned to more than one person in bigger organisations. The roles and duties that were assumed under the founder member of the firm included – generating sales, Project implementation oversight, Research and development, and core Back office support functions (invoicing, payments, legal requirements). The tasks were obviously a huge burden for one person to carry, however, when looking at the core activities resident in these functions, the tasks were indeed achieveable (the invoicing and related corporate requirements did not consume large parts of a day; also, the research and development were used in context of client delivery, wherever possible; the project execution was really the support provided to the client during the normal “nine-to-five” working routine).

Attractors in the landscape

The attractors resident within the South African landscape refer to the pervasive issues that confront business, government and other institutions in a fundamental manner. These are forces that impact the overall market in various ways, and brought to bear on a system from various sources of perturbation. Typically, it could come from within the local system (e.g. the lack of qualified and experienced resource capacity across public and

private sector in South Africa); It could be thrust from a sub-system (e.g. the focus on governance, accountability and transparency by government - PFMA); Or, it could come from an external or higher-level system (e.g. the international focus on Poverty Alleviation, and AIDS). The key aspect is to recognise that such forces or attractors do exist, and have an impact across all businesses. The key attractors that had been identified as important for this work in a South African context, were: Lack of qualified and experienced human resource capacity; Black Economic Empowerment; and Innovation.

Lack of qualified and experienced human resource capacity:

South Africa has a deep lack of experienced resource capacity, the reasons for which, are many. Suffice to say that shortages cover all vertical segments of the economy, like medical, engineering, finance, and management. There is very little that can be done about this in the short-term, over the medium to long term, much can be done, with the SA government responding with a range of initiatives to address this area (training, mentoring and coaching). The firm's response to this was to enhance it's deployment technique (the traditional model of engagement, dictate experienced and dedicated team leaders, with an equally strong implementation team). This reality also impacted skills transfer, which needed to be upgraded with additional techniques that allow for rapid learning and continuity (e.g. shorter and more pointed documentation, having a number of diagrams and maps that assist in explaining the

processes). This communication approach usurped less time, whilst retaining quality functions. Another component in the construction and retention of institutional memory, was introducing a knowledge repository: process maps, project guidelines, templates, and related, practical documentation that explain the approach adopted, the logic for it and how to continue using and improving upon it.

Black Economic Empowerment (BEE)

Since South Africa's emergence from it's Apartheid legacy, a central issue on the socio-political agenda has been the introduction of policy measures to "reverse" the socio-economic imbalances. The importance of bringing the previously disadvantaged communities into the mainstream economy, cannot be overstated. This attractor therefore will remain a relevant force in South Africa, for quite a while still. As with any attractor, it can have a positive or negative impact across any business, depending upon the response generated by the business in dealing with the attractor. Since the researcher/designer of the firm, belongs to a previously disadvantaged ethnic grouping, it did qualify the firm to claim the status of being "BEE". Having said this, the formal position that had been assumed, ignored the potential advantage this status afford BEE organisations. The decision not to "sell" ethnicity resided in the belief that the value proposition offered by the organisation, contained sufficient motivation for its existence. This however did not detract from the impact this attractor have on the overall business (e.g. being advised to include other ethnic groupings as

shareholders; being lobbied by other organisations to merge, partner, and collaborate; ensuring that legal, legislative and governance issues are complied to). All of which have a material impact on the daily activities of a business, which should be considered, and accommodated for in its overall planning. The internal decision not to promote the procurement of work through ethnic qualification, was taken to ensure the competence of the organisation and its solution base, be tested against the market forces, without any overt bias (i.e. BEE credentials were only provided upon request, and not marketed as a key aspect of the service potfolio of the firm).

Innovation

Looking at most of the higher-performing economies, countries and organisations it is clear that a vital component in their sustainable success, comes from the concept of innovation that are applied throughout their structures and operations (usually reflected in their registered patents and Intellectual Property aspects). Because of their ability to innovate and subsequently change with the landscape, they retain their leadership position and sustainability. Including innovation as an attractor are based upon these realities, as well as the inherent qualities espoused in the business architecture model (emergent properties of learning and adaptation requires the capacity to innovate). The innovations the firm focused upon related to dealing with key attractors (especially the lack of skills), and the firm's practical lessons at project level (example being the

concept of a project office, whereby the traditional project management implementation team is centralised to a higher level, which the firm referred to as a "Strategic Scalable Programme Management Office" (SSPO) - the essential difference being that it added a great deal of strategic elements to the basic project management body of knowledge, helping to align the delivery of the solution to the organisation's vision, and also introduce "scalability".

The large, local skills gap and lack of capacity, often result in clients requesting the vendors to assist in areas, outside of the original scope of work, often impacting the original plan. Furthermore, in catering for skills transfer, clients may wish to use much of their own human resources in the execution of the solution, which reduce intervention cost. The notion of a "Scalable Strategic Programme Office" (SSPO), thus allows risk and reward sharing in a transparently regulated process, by promoting a performance-oriented relationship in the project environment (client and firm team members). Essentially the SSPO offers scalability to clients, i.e., the ability to scale expert resources upwards, or downward in terms of project size; the number of team members; the scope of work; and the number of subject area specialists needed. The concept also reduce timelines attached to lengthy procurement cycles, and can be a mechanism through which to perform short-term, adhoc pieces of work that tend to be ignored when scoping the larger interventions (see figure 5.11).

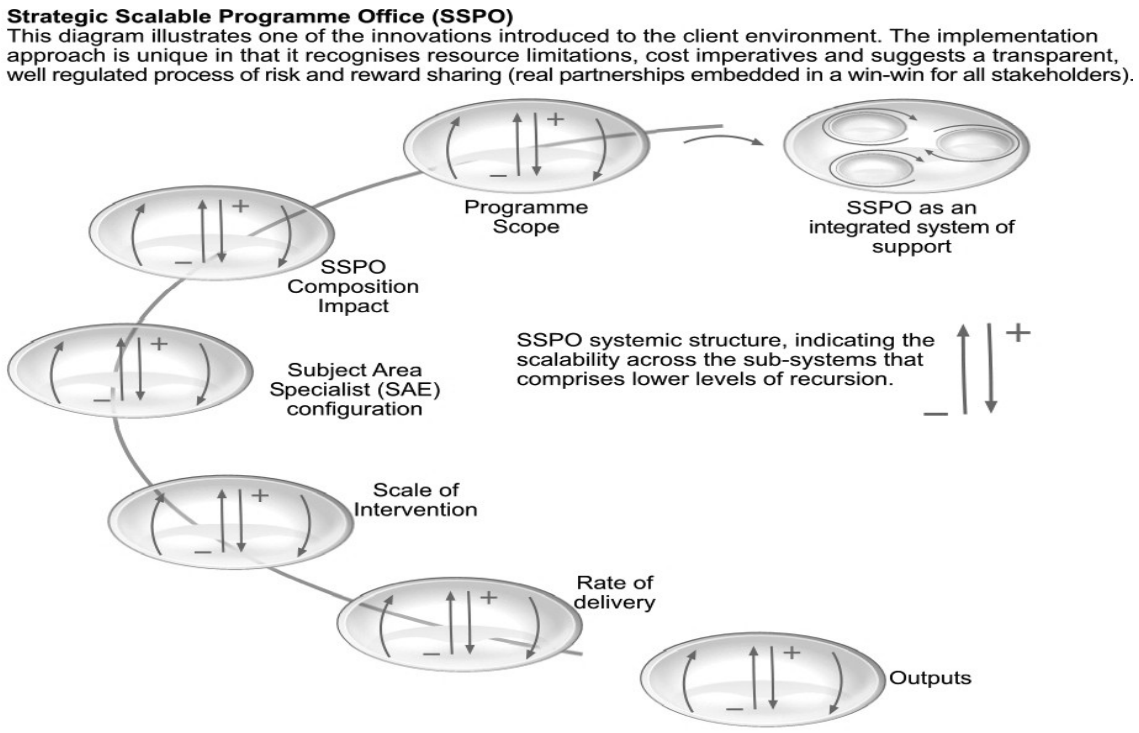


Figure 5.11: Strategic scalable programme office taken from BAT software

The innovation as expressed above, address key attractors and other realities within the SA business landscape. The ability to scale the intervention, either upward (larger project team) or downward (smaller project team), as expressed in the "+ve and –ve" signs under each supporting sub-system of the SSPO, represents a significant shift in paradigm, and have the potential to reduce cost, enforce transparency and ensure greater value-for-money.

Uncertainty and emergence

The concept of an emergent business landscape and the related uncertainties resident within such structures can be disheartening and even disabling to a degree. In trying to create a deeper understanding of

what uncertainty and emergence imply in the business context, initially caused confusion and discomfort since it touches upon our innate propensity to have control and certainty in outcomes. However, in thinking more about the systems that needed to be engaged, and how best to search for "levers of influence" resulted in an improved understanding of absolute certainty and how in fact, our best plans are mere probabilities across the landscape. This amended view resulted in the focus across three core aspects touching upon uncertainty: Self-motivation and the retention of a positive mindset, and less effort invested into attempts of controlling external systemic events; Changing the viewpoint of what a sale truly is; Discerning between medium and long-term sale cycles, and what it implies.

Positive mental approach and "control" of systemic events

Appreciating that social systems are highly unpredictable, is not easy to deal with (at least at the beginning), and takes a concerted effort to accept the business uncertainties faced each day. Ackowledging that the absolute control we seek is impossible, it seemed appropriate to invest effort into areas that allow us some form of influence over the systems we operate within. This implied that, to improve our probability of success, i.e., to move the system toward the overall desired outcome, we needed to ensure we perform well, across all the functional systems, and their sub-systems, impacting the event. Such a position implies the firm, to do it's best, across all endeavors impacting the sale event since we do not know with any

certainty which of these parameters are more important than the other. This point reinforces the fact that all aspects related to the sales "system-in-focus" be addressed efficiently. An important benefit that resulted form assuming this stance, was the positive mindset that most likely comes from knowing that efforts are invested into all the important areas. Remaining positive with a great dosage of realism create comfort in knowing that we can only do so much, and that often, the best efforts are not rewarded with the desired outcomes. An important aspect in this instance was the realisation that although we cannot control outcomes, we do have the ability to influence the systems, and in doing this, have the capacity to improve our chances of extracting the general outcome we desire.

Changing the view of a sale event

The challenge in this instance was our understanding of what a sale event was. It is customary and standard practice to put a monetary value next to a potential client (e.g. say client "X" requires a R10m data-warehouse), and based upon such information, develop plans in the pursuit of the monetary value (the number becomes the target). However right or wrong this may be, it results in a highly pressurised sales team and a revenue forecast, often punctuated with great optimism. Furthermore, for an upstart firm, such a classic sales and revenue target setting process can become cumbersome and resource intensive. Revenue forecasts, when presented as a total target for any planning cycle (12 months, 6 months, 3 months), appear very enticing. Furthermore, based upon previous experience, such

traditional lead development strategies does not imply successful attainment of the sale, and weighed against the resources required (dedicated resources, planning, meetings), presented an additional challenge for a start-up firm. The adjustment that was made in this context was simple, instead of viewing a sale event in terms of a number (usually large project values), we opted to amend this perspective by viewing a sales event as, obtaining or ”landing” a new client or project, irrespective and separated from a project value. This simplistic adjustment of what constituted a sales event reflected a core consideration that the target should be finding and securing a new client. From a psychological perspective, this appeared much more readily achievable than the traditional pursuit of a monetary value, thereby creating improved confidence and motivation (e.g. pursuing a R10m sale Vs pursuing 1 new Client). In any event, the scope creep on most projects, present another perturbation from the client environment, often, decreasing, or increasing the project values. In changing the view of what a sale constitutes ensures that team members are not disabled in terms of the large contract value traditional sales approaches tend to reinforce. Putting the focus on landing a new client and project, as opposed to a large number have a much more calming effect and represent a mental model of a target that is much more achievable. Considering that the actual outcome, is to obtain new clients or opportunities, and should we prove our value in the delivery process, this in itself would improve our chances of creating additional growth in revenue.

Discerning between long and medium term sales cycles

When looking at the uncertainty and probabilistic nature of the sales cycle, it is clear that our traditional interpretation of long, medium and short-term opportunities reinforce that fact that we tend to view these period-based opportunities as factual (evidenced by our hiring and firing of people, based upon sales targets). Despite the uncertainty resident in each of the period-based opportunities (i.e., a longer term opportunity may be realised much sooner than say a medium-term opportunity, likewise, a short-term sale may in fact turn out to have a long-term cycle), we nontheless tend to view these timescales as definitive or absolute. Making decisions in this manner often result in problems with cash flow, cash-timings, and resources. It is also a reason why many startup firms and SMME's fail (since they tend to base their planning and operational activities upon such notions of absolutes). The essential difference adopted internally to the firm in this regard, was to appreciate that there is very little that separates long, medium and short-term planning of any sort. In fact, from a complexity perspective, all three areas are really each a probabilistic outcome, with the near-term ones enjoying a greater propensity of being realised due to the greater amount of information available to short range planning. This realisation still does not provide any additional comfort regarding certainty, but may add value in terms of how we alot time or resources to the various possibilities contained in the planning cycle, i.e. the sales "pipeline" is a probability range, with the higher chances of

successful outcomes predominantly lying toward the short and medium term range. Despite recognising this, it is imperative to retain the view that the entire chain is probabilistic, and that often these potential opportunities, may in fact swap places in terms of their location within the sales pipeline. Thus, whilst it becomes wise to focus efforts into the short-term sales events, care should be exercised, in that the focus must not be so intense as to ignore the medium and longer-term opportunities, as all the opportunites are dynamic in nature. The decision was to focus efforts upon the short-term opportunities, whilst keeping a watchful eye over the medium and long term ones.

5.2.1.5 Summary of cycle 1

The interventions reveal similarities regarding variety, capacity constraints confirms literature expounding the messy nature of real life and the dynamicism attached to constant movements and perturbations. From a prototype perspective, the immediate impression and value seem powerful enough to generate rapid and meaningful constructions of deeper, wider problem statements. However, this raised the questionable decisions clients may take despite having improved planning and implementation designs. Even in resource contrained environments, such divergent decisions compared to those designed and proposed, could be dealt with much better, instead client decisions seem to be based upon undisclosed agenda's, and the commonly cited "resource constraints". This may touch

upon leadership issues, such as the OAG project suffering a 14-month delay, due to leadership related weaknesses (Quinn, 1996), whereby agent behaviour within agencies, tend to look for “insulation” against potential negative outcomes when adopting innovations or when taking creative decisions, which in the case of the OAG, only after explicating our plans to the most senior official, did the project proceed with the original prototype planning. The hierarchical or structural seniority is strongly lodged in the public sector, whereby decisions when sanctioned from higher levels of the organisation are readily adopted, alleviating lower level management from the leadership anxieties and consequences of decisions. As interveners or consultants this is both “dangerous” and frustrating. Dangerous in a sense that the project sponsors tend to ask the external consultants to prepare internal presentations and motivations for interventions, leading to a reduction in their own variety due the reliance upon external support, whilst at the same time allowing entrenchment of sorts for the vendor, consultant or service provider. The frustrating aspect relates to the delays and extended motivations that the external project team are made to bear.

An interesting aspect under this cycle relate to the model application of “new projects”, meaning projects which the firm were a part of since project initiation; Compared to “existing” projects, where as a firm, we arrived onto projects that had already been initiated. In both instances the value of improved integrated planning dimensions were clear, but surfaced another common challenge in terms of convincing stakeholders of “existing

projects" that the intervention challenges being faced, was in fact caused during the planning part of the intervention (e.g. Vulindlela; OAG). Intimately tied to the above are the challenges in "new projects" where it is expected that integrated planning dimensions would be easier to infuse into the interventions, since it is largely still in concept stage. These instances also have challenges since even when clients readily appreciate the virtues of improved planning, they still have a tendency to "short-change" the integrated prototype planning. The reason for this are usually ascribed to apparent budgetary constraints and resource limitations by clients. Whilst these are real challenges for any organisation, the investment formally sanctioned, tend to then be wasted, and may even cause more harm than good. Typically this is true when robust problem definition and integrated planning suggest higher order investments and budget, than what has been set-aside. Reducing the implementation of the intervention may be prudent from a budgetary perspective, and squeezing efficiencies from the implementing agency may equally appear as sound business, however, the nature of the reduction in budget does not have a linear relationship to the integrated planning and implementation (e.g. Vulindlela; OAG projects). Variations of this feature can be seen across the private and public sector, where tenders are awarded to the lowest bidder, who eventually cannot deliver the desired outcomes; where large amounts of resources are invested into strategic planning sessions, but are hardly infused into operations; where officials spend great amounts of time abroad but seldom bring back the lessons and application innovation to

their departments. Furthermore, the budgetary cycle in the public sector, called medium term expenditure framework (MTEF), does allow sufficient forward planning and setting aside of budget, based upon sound reasoning and investment into the strategic objectives of the various departments. So, despite the mechanisms being available, these are hardly accessed, and tend to be used inappropriately, touching upon governance and leadership aspects within client domains. This common feature result in annual under-expenditures of most departments, thereby incurring an increase in the cost of capital at National level. By implication, in itself substantiating the inability to plan efficiently and effectively. This realism must be dealt with in the field, which touch upon the capacity to innovate and adapt. So despite gains from integrated strategy and planning, the inability of clients to budget or use the budgeting cycle, still tend to work against practical implementation of such plans (greater, wider, deeper scope than those captured in the tenders and tender budgets set-aside). This interlocked dynamic of better problem statements versus practical budgets formally set aside for interventions that were badly constructed, defeats the integration sought, and link root causes to bad financial forecasting and programme budgeting, which introduce the wicked-nature of the context as it touches upon a mayriad of factors that require consideration (governance; motivation for additional funds; slow-down in delivery pace; key aspects of plans being deleted from robust designs; political support and sponsorship; competition for resources). Thus whilst prototype-planning promote systemic views across interventions, the gains

are reduced due to client specific issues, and self-imposed limitations (experience; Planning for their budget; Lack of understanding their own internal proceses and capacities), invariably dilute the actual implementation plans signed-off by clients. The limitations and scarce resources are far too often used as an excuse for implementation “dilution” since institutional budgetary cycles and funds are accessible, but not dilligently followed, effectively accesed, and planned for by agents within departments, a reality supported by the annual “fiscal dumping” and the return of large chuncks of funds to the National Treasury, due to under-expenditure by departments. From an implementation viewpoint this is a frustrating element, knowing that sound planning and solutions are available, but are hamstrung due to internal controls or protocols not being diligently exercised to secure the funding due to the lack of variety inherent in public sector. This lesson was also why it became prudent to revisit notions of innovation in terms of implementation (finding possible means of working around limited budgets within the boundaries of governance).

The prototype notion of it’s architecture promote deeper thinking and integration: e.g. various expertise needed by the OAG project; the crucial gaps regarding strategic pre-occupation versus weak implementation of plans and ideas in the RBEB project; Vulindlela’s project lack of expansive thinking, and weak plans that excluded user needs like training for budgeting, management reporting needs, and the information technology system being designed and built. The gains resulted in redirecting the

intervention from an information technology project, to a process-driven solution, recognising systemic factors such as training of 15000 staff; data capturing quality; inability of officials to observe appropriate budgetary forecasting techniques, aspects which had not been appreciated before. The results from the "world of the designer" (internal projects), despite being a different application area, revealed similarities to that of client projects, especially regarding the extent of resource constraints. Considering the firm's key objectives of R&D, Business Development, Back-office Functions, and Project delivery as key outputs and sub-systems of the system-in-focus (Internal Operations of the firm), puts into perspective the great divide that often exist between ideal framework requirements and what can be achieved using available resources. Systemic perspectives tend to reveal a host of issues that are related to an outcome, and often can make objectives appear daunting and even unattainable when forced to consider resource limitations. However, after deeper reflection, it appears that sub-system priorities should be allowed to fluctuate, based upon an organisation's most immediate needs. This notion was tested in the firm whereby 2 core objectives, Sales and R&D, were allowed to replace each other in terms of immediate focus. The focus implying the sub-system that demands highest priority, in context of the most immediate organisational needs, such as for example, to allow the research and development sub-system, to be "stalled" or "put on hold", whilst focusing intently upon the sales sub-system, since viability of the firm requires revenue as a priority. Both sub-systems are vital for a viable

organisation, yet, at start-up phase, the need to close a sale was deemed more important than R&D, since a successful sale, will create revenue to continue with R&D. The importance of allowing this “fluidity of sub-system priorities” was important since it relates to allowing some form of emergence to prevail. It may also be these small differences that entrepreneurs unknowingly or naturally navigate by? Indeed all projects have stumbling blocks and perhaps to a lesser degree suffer from resource constraints, but it would appear that deeper systemic emergent prioritisation, may dictate or even force managers to question the choices that are made in context of the immediate situation. These insights were relied upon to determine for example, where to focus when considering the revenue and sales sub-system, and the choice of pursuing opportunities where some form of relationship and leverage existed, as opposed to blindly responding to public tenders. The idea was not to relinquish public tenders all together, but to select more carefully which ones to pursue, and to continue to invest in these opportunities since it aids the firm strategically by building and honing internal skills regarding cost models, solutions and tender templates.

The advance alerts was another windfall, when looking at the strategy of “playing multiple roles”, whereby one person had to perform many functions, suggested that despite it’s effectiveness, ongoing or prolonged multiple-role playing was predicted to usher in a few challenges, more specifically the “stretching” of key resources; biased learning disposition

against challenging tasks such as completing tender responses, in favour of easier tasks. All these instances therefore suggest an improvement in terms of potentialities that may arise due to decisions that are based upon immediate circumstances. Although applying the prototype in context of a start-up business proved disconcerting due to the extreme resource limitations (no real seed capital; no access to funding; no staff), the lesson is similar to that of clients whereby the focus of sub-systems within the system-in-focus, are directly affected by the current organisational conditions, citing the dynamic external environmental impact upon sub-systems and the whole. It may be this rich dynamic interplay that render managers helpless when initially trying to adopt systems practices and tools. Also, for the firm, project delivery being a focal sub-system, was embellished by improving its own tactical architecture such as improved screening of potential candidates for both project and permanent staff (people sub-system of the tactical architecture); refined procedures and processes covering reporting and payment of salaries (process sub-system); and enabling technologies for the firm itself, such as investing in it's own servers, networks, desktops and accounting software (technology sub-system of the tactical architecture).

5.2.2 Action research cycle 2

5.2.2.1 Data-warehouse (Vulindlela)

Review of decisions

In defining the problem areas into the strategic, tactical and operational architectures, highlighted pertinent issues and constraints impinging the overall project delivery, revealing an enhanced value proposition to the client. The revised planning resulted in the overall growth of the project to the benefit of both the main contractor and sub contractor (firm). The dominance regarding planning aspects, provided an unanticipated egocentric platform to the firm's team members, which became a serious threat to the firm (e.g. being fired or marginalised by the primary contractor). This required internal intervention and work-sessions between the two vendor teams, to explain the need to be sensitive and adhere to reporting protocols that display the required governance and respect to the primary contractor. The extent of the problem required on-going intervention and team building, which have a direct consequence in terms of opportunity cost to the firm as it usurped resources that could have been optimally applied elsewhere, and serve as an example of unhealthy power-based competition.

The ethical concern regarding software licenses was interesting on this project, and since all business imperatives are naturally inclined to realise profit, it was educational to see how some of the bigger and more established organisations operated in this regard. Being driven by sales targets, great pressure are put on all accounts to grow revenue and secure ever more contract revenue, translating into a "hard sell" to meet targets. A frequent outcome of such sales pressure, tend to result in selling products

and services that are not technically needed in the client environment, but are simply sold, to ensure sales targets are met and clients are “locked-into” long-term contracts (Williamson, 2005). This concept was evident on this project, since the review process uncovered the project had far too many software modules than what was necessary, with some modules still being in beta-stage by the software development firm (a total of 26 different software modules had been sold to the client, with only 3 being required to manage and deliver the project). The extra modules were sold into the environment, simply to make the sale in terms of the annual license revenue of millions of Rands. The root of the ethical dilemma stem from the commitment by the firm to create value to both the primary vendor, and the client. Since we increased the scope of the work in terms of the manpower and overall mandate, we thought it a good idea to table our findings, which included the cancellation of unnecessary software licenses, thus presenting a saving to the client, without impinging upon project functionality. This recommendation seemed like an appropriate value proposition to the client, but resulted in large revenue losses for the main contractor. Not only did the revenue losses hurt the primary contractor, the fact that the “abuse” was allowed to continue for years, prior to the development of an appropriate technical architecture, was a much more severe blow. The entire incident, albeit designed to achieve a successful project outcome, resulted in strained relationships between our firm and the primary contractor. After months of tension, the improved development throughput and the growth in the overall project size made the event

dissipate without much pressure from the main-contractor. The lesson however remains a stark one, highlighting the abuse of long-term vendor lock-in as noted by Williamson (2005), and the pursuit of revenue, without any reciprocal value creation.

5.2.2.2 OAG - Financial Management improvement Programme (FMIP)

Review of decisions

The project proceeded with the client-imposed limitations of the proposed plan, excluding key components like process engineers, business analysts, integration and mapping functions deemed vital for delivery. Despite qualifying the broader, systemic view, the client believed the project required only financial expert resources (policy research and development), thus a typically narrow accounting project definition was formally sanctioned by the client. After a six-month period, we had very little progress, other than a great deal of policies that have been developed, but not released for comment and thus not having been tested in any manner. Perceptions of non-delivery and severe critique surfaced from various stakeholders toward the Office of the Accountant General (OAG), resulting in our senior team accompanying the OAG to present to the Director General and Minister, as to why the slow pace of delivery. Being such a high profile programme, with strong governance nuances, resulted in greater pressure on the project since many government departments and agencies have been blamed for mismanagement,

corruption and lack of general financial controls. All of these issues thus precipitating into greater pressure upon the OAG.

The prevailing view of a slow and impotent OAG, was a serious threat to the client, the project, and our fledgeling reputation. After explaining to the political heads, all the issues that impinge upon the project, and the reason for the perceived slow delivery, we were immediately tasked to develop and table a fast-track programme. The result of this emergency replanning yielded a strategy that was very close to our original prototype planning. Despite the delays in not adopting the original intervention, the added political support firmly behind the project, created much needed and necessary championship for the intervention. Importantly, the client and Minister of the Treasury realised the importance of taking an integrated and parallel intervention approach, ensuring the project enjoy greater support and thrust, resulting in amending the core requirements of some of the posts in the official organisational structure of the OAG, to allow for “wider” qualifications to be accommodated (flaws in the dated organisation design gave rise to rigid and one-dimensional job profiles, predominantly geared toward Chartered Accountants).

A key amendment to our planning was the incorporation of a stronger communications aspect, deemed vital for matters of integrating government transversal systems and processes to be compliant to the

newly adopted accounting policies. The intent was to communicate the systemic plan to all stakeholders, in order to get support and more importantly to obtain feedback into the policies that had been readied for adoption and implementation. The parallel deployment strategy was difficult to have sanctioned since the client believed it went against the grain of delivering a perfect policy for implementation. Our argument was however based upon the rapidity of delivery, and the fact that a policy is not intended to be "perfect" since they are designed to regulate and create consistency, and these can only be achieved by "testing" the policy in a live environment, which would in turn provide insight as to its practicality, applicability and efficacy, thus the process itself is iterative and must necessarily be such in order to continuously improve policy instruments. Such resistance to innovation and creativity may tie in with the notion of "skilled incompetence" (Argyris, 1992).

The project experienced another distraction during cycle-2, this time, stemming from the software systems (technological sub-system of the prototype's tactical architecture). It became evident that the software and hardware aspects of the Technological architecture, evoked great external interest, exerting influence from powerful lobby groups and international software and hardware organisations. The interest groups converged upon 2 areas; one area relating to the current vendor applications and firms maintaining the current "IT" transversal systems of government (the financial system, logistics system, and Payroll/HR system). During the

evaluation, the inadequacy of the current systems were revealed, in terms of the new requirements (legacy-systems were between 10 and 26 years old at the time). Additionally, much of the functionality that was supposed to be in place, was in fact not available. The second interest group were software and hardware firms, seeing the potential opportunities, contracts, and business resulting from the inevitable replacement or enhancement of current systems. To put this into perspective, the annual spend for the maintenance of the software systems were roughly $1 Billion per annum, with replacement costs estimated at $2 Billion. This large technological opportunity introduced a different dynamic impacting the programme, typically in the form of lobbying, misinformation, and protection of current systems revenue. This single aspect impeded project progress, causing delays by having to engage with all stakeholders relating to technology and their views on system requirements.

The myriad of selfish forces (internal and external stakeholders, either protecting current systems, or those wanting to replace it with new systems) precipitated diversion of resources from the project office.

As the implementation team, we tried to remove the lobbying and related distractions, to a place, outside of the OAG's project office, by setting up a working group, comprising all stakeholders to drive and manage the technology segment in a collaborative manner. The original strategy and project planning required us to develop public-private-partnerships (PPP models), for the technolgy aspects, which would allow a more equitable

sharing of risk and reward (current IT support models were abusive and costly for government). Ensuring the IT procurement process to be transparent and fair (to reduce the intense lobbying, misinformation, double agenda's, and distractions impacting other vital work streams), it was decided to introduce "board room pilots" whereby pre-qualified vendors demonstrate their solutions and how it supports, or fits into the transformation process sought by the client. This plan effectively shared work-load and risk with the lobby groups, whilst providing the team to focus upon other work streams. After the forth year of the programme, the client environment underwent restructuring, resulting in all "IT" systems being taken from the control of the OAG, and vested with a different department, requiring us handing over all the plans and strategies related to the software and hardware interfaces to the new owners,

with the proviso that the OAG would dictate the accounting rules and policies that the systems are to enable. The changes in the client domain over the years have seen our team working with four different Accountant General's, each having their own views, with the latest OAG's management style and approach being inward focused, in stark contrast to the original strategy developed. He insisted the project focus upon populating the formal structures as a priority (filling vacant posts of the organisational structure), resulting in the fifth year of implementation being driven by official appointments, and lessening the reliance upon our project team, which had been a part of the intervention planning (skills transfer to

the client as part of our project commitment). However, the new head wanted to build internal competence, as rapidly as possible, despite our experience in this regard (difficulty in finding experienced black Chartered Accountants and Finance subject areas specialists). Explicating the limitations in finding experienced and qualified "Black" Chartered Accountants willing to work in the public sector (private sector was willing to pay more than double for the same resource). The new OAG insisted in taking the best available staff, irrespective of BEE credentials, and appear to hold a view that we encountered at the very beginning of the project, more than four years ago (adopting a vertical, silo view that the intervention is based upon finance expertise only). This supports observations from Boyatzis, Cowen and Kolb (1995) regarding local deficiencies in interpersonal skills, communication skills, insufficient global thinking, and inability to work in teams.

A major concern was the new OAG's view on his mandate, which he interpreted to be very shallow and simple, with no intent on having any form of aggressive compliance, a veiw that resulted in his predecessor being called upon by his superior's due to slow delivery. The last year of our project (mid fourth to fifth year), was therefore engaged in maintenance, skills transfer and an exit plan for our team.

5.2.2.3 Royal Bafokeng Economic Board (RBEB)

Review of decisions

The work relating to the overall business architecture was formally adopted by the organisation, but after revisiting their strategic architecture, much time was lost by the senior executive team on their internal debates on how they believed their mandate should be interpreted. The verification of their entire strategic planning in a sense, introduced unintended delays, but was allowed by the CEO since his newly appointed executive team needed to have clarity of understanding as it was material to their areas of responsibility and accountability. Since the purpose of the exercise was to align the respective business units, its functions and outputs to the overall vision of the organisation, and that of the Bafokeng Nation (i.e. Vision 2020), it was signed-off after months of amendments and changes. Another issue was the lack of practical experience from the executive team of the cleint, creating a weakness across the operational architecture as the capacity to implement was lacking.

A concern arising from this area was that, the more executives that were recruited, the more the project team were asked to assist them, creating a backlog of issues that remain unresolved. Our subsequent recommendation was to clearly divorce the roles and responsibilities between our project work, and that of the executive team of the organisation. In separating the roles and responsibilities, we were asked to retain our role on the strategic alignment and continuous improvement aspects, with only one additional “problem project”. The problematic project was that of the Small, Medium, Micro Enterprise (SMME) development programme being run by the client. This programme was created to assist

Bafokeng SMME's to become professional and efficient in their delivery of services and products to their client-base. The project required the RBEB to assist the SMME's in various ways and to various degrees, some requiring budgeting assistance, other marketing and branding, most however requiring cash-flow management and general business skills. This range of assistance needed by the SMME's caused the management of RBEB problems. The political pressure exerted by the Nation, onto the mining houses to ensure that local Bafokeng SMME's were used in the procurement chain of these organisations, was achieved with great speed and willingness, resulting in many local SMME's obtaining contracts (cleaning, maintenance, rehabilitation, supplies, and construction). Many contracts were not however delivered upon by the SMME's causing a number of failures and embarrassments (e.g. Mining houses providing advance payments to SMME's). Whilst the technical service delivery aspects of the SMME's were reasonable, most of the failed cases were a direct result of cash flow management, and an over-reliance upon contracts based upon ethnicity (being Bafokeng implied a virtually automatic qualification for contracts from the mining houses), creating a dependency and a lack of motivation to grow the businesses.

In order to become more effective in this context, the plan was to establish a contracts management office (CMO) within the RBEB, which was an attempt to centralise the assistance and mentorship programmes directed toward assisting the SMME's in a holistic and sustainable manner. The

running of the CMO was an additional contractual obligations from the client, and was instituted rapidly since the arrangement with the mining houses was, that only CMO-approved or assisted SMME's would be qualifying for work and contracts. The intervention proved successful, since the focus of the CMO was to provide training on current, live projects the SMME's were awarded, or in the process of executing. The initiative was designed to deliver templates and models that were "light-weight" in that it only contained relevant information, as opposed to providing large, more involved and complex processes. The practical application of these "light-weight" processes allowed for better through-put and easier understanding, and over the first six months was well received by all stakeholders. Key in the success was the focus of practical assistance and mentorship, much like "learning-by-doing" within a live context, as opposed to traditional training and mentorship programmes that are designed to provide boader and deeper educational shortcomings.

An unforeseen problem seemed to surface by the newly gained respect and popularity of the CMO initiative, and thus our client, the RBEB and its CEO. The issue surfaced was really a "political" one, touching upon the growing popularity of the RBEB and its CEO, since he was pushing for all of the other organisations within the nation, including the holding structure (RBA), to adopt similar transparent and governance rich proceses.

5.2.2.4 Internal operations of the firm

Review of decisions

After almost 13 months, it seemed the approach to the marketing and sales strategy, pointed in the right direction. The systemic parameters identified in cycle 1 (*Internal operational capacity*; *Uncertainty*, and *Attractors* in the market place), helped to explain a number of issues we had to deal with, and how best to treat and navigate these factors. Approximately eight months later, the firm grew from one fulltime staff member, to twenty staff members, with key lessons during this period being:

Sales channel mix/ratio

The channel mix of responding to the various published tenders and submitting proposals yielded some of the following. The firm submitted more than sixty tenders over a 12-month period, five of which we were short-listed and interviewed, of which we did not win anything. When considering the average investment (direct cost of roughly R70 000,00 per submission) that goes into such an effort, it became a real concern. Although we anticipated a low success rate in winning such tenders, it was non-the-less a concern when weighed against the average cost of the exercise. Reflecting upon the results of our tender efforts, it became clear that winning tenders were not only about putting in a sound technical bid, nor was it purely about being cost-competitive, a great deal of "relationship access" seemed to be needed as well. Since our technical submissions were of a high quality (much of the standards used by consulting firms are

the same), and we knew that our cost structures were of the most competitive (very low overhead costs). It appeared that our lack of having reliable relationships was predominantly the reason for our bad performance in this regard. Having limited or non-existent relationships within the various client domains, particularly from where the tenders originate, seemed a distinct disadvantage.

Despite the statistics, we maintained our effort in this regard, driven by the value-add it presented the organisation like developing templates and improved proposal writing skills, providing vital support value to the internal operations of the firm. The fact that we were crafting solutions for various clients and projects, challenged the team in the application of the models, and more importantly, provided the firm with experience of how to put such responses together, creating a knowledge repository for our tendering process. We did however, add an additional pre-screening criteria for pre-qualification of tender bids or submisions. In recognising our limited reach in terms of relationships, we opted to start “partnering” with the bigger, more established brand organisations (KPMG, Deloitte & Touche, Accenture), as opposed to compete against them, thereby using the “partners” network of access, as well as their more trusted and established brands, in order to maximise our chances of successful tender submissions, whilst also reducing our cost of bid preparation.

Focus on "low-hanging fruit"

The "low-hanging fruit" or "quick" sales can come from various areas, particularly where there are known and trusted relationship, with either and agent or agency. This search criteria resulted in the conclusion of the very first contract (a sub-contract to a service provider, with whom the "designer" had a trusted relationship). Exceeding the delivery expectations on this project, resulted in additional work as sub-contractor. The original approach of focusing the sales efforts into areas where we had relationships seemed to play an important role, however, an additional reason for the growth also touched upon good performance at project level. Having created real value to the client, appeared equally important since it provide tangibility of the value proposition verbalised in sales meetings, and as such increases the level of trust and respect, which in turn translates into clients having a greater propensity to request assistance in future.

Multiple roles

The reason for playing multiple roles (sales, project execution, and back-office functions), were encouraged because of the lack of resources during the startup phase. This plan worked exceedingly well and allowed the firm to build cash reserves, whilst reducing the overhead structure to virtually zero. The concern or weakness in the approach was that it did not appreciate the increasing effort that these functions required as the firm grew. Over the first three years, the firm had virtually no overhead, other

than the accounting and auditing fees, and from a cash flow perspective this was indeed a high-yielding strategy. The growing burden however seemed to affect other areas within the system, typically, the quality control function (key resources being spread thinly). Despite this sense, the decision was to continue in this vein, to build greater cash-reserves, and was opposed by the senior managers, perhaps due to their inability to relate to the importance of having robust cash flows. As the founder/researcher, the push to create overhead from managers, was resisted due to “fear” since it was never entertained before. After weeks of debate, it was agreed to invest in offices and related infrastructure (office space, equipment, and more administration staff).

This decision, worked against the author’s original intention of developing cross-functional experts in the firm, implying having partners with the ability to create sales, as well as being able to deliver value in the execution of the project, thus growing the business in this manner. After subsequent months, this decision was severely doubted, since investment into the firm (offices; dedicated administration staff; sales & implementation staff), should generate greater efficiencies, and growth in performance over areas like Financial functions; Billing and adminsitration; and Revenue or turnover. Instead performance of the back office was not up to the desired quality with major mistakes in: the Payroll; Billing rates and invoices; late payments and a number of niggling small problems that hardly occured before. The lessons learned in this instance are twofold: (1) The “multi-

role" strategy, adopted from the outset appeared to have degenerated, suggesting the expectation from all team members to be able to think, behave and operate in a multi-task fashion was unrealistic. Some of the reasons may be that the team members all come from an environment having defined, linear, segmented roles, responsibilities, duties and boundaries, versus the dynamic of cutting across and supporting multiple functions; Another reason appeared to be that most of the team members viewed themselves as "employees" as opposed to "owners" of the organisation (despite share equity being in place). Additionally, the multi-role strategy seemed to serve its intended efficient and educational purposes, only to a certain point or threshold, whereby too many projects and clients resulted in severe overload of key individuals, eventually diminishing overall delivery; (2) Another lesson related to the assumption that the back office would not require training, instruction and management oversight in ensuring minimal standards and performance. This prompted an even greater investment in terms of additional senior office staff to assist in the management, training, quality assurance, measuring of standards and performance. Both instances touch upon insights from Oshry (2008) regarding how systems perspective introduce new levels of understanding and how challenges viewed as personal are in fact systemic. Furthermore, Morgan (1986) notes how organisations can contain multiple elements being interconnected, cemented by Churchman (1982) who uses the example of inventory levels and say transport within an agency. The adminstration and back office support team appeared to

operate in a manner that was contrary to the firm's propagation of systemic connectedness and instead arranged themselves in a manner that reduces structural variety (e.g. the payroll mistakes and the disconnection of raising timeous invoices to clients).

It seemed the multi-role strategy requires a great deal of selflessness, sweat investment and entrepreneurial spirit, having a keen view on personal growth and the success of the collective. The challenge suggest very few agents are willing to undertake such mandates, despite the rewards being clearly articulated and presented. It became evident that some agents do not wish to have stresses and challenges in their work-life, instead, they prefer to have a clear idea on their outputs, and are willing to be regulated by the "9:00 to 5:00" tradition, with very little else being important. Initially, this lesson was quite disheartening from a personal view, since in one manner, it defeats the creation of an organisation that remain open and eager for knowledge across all levels, able to learn, adapt and generate innovation (emergence).

Hoebeke's (2000) view on mistakes we make between discussing human activities without considering defined outputs and functions; as well as Beer's observation regarding the difficulty of tasks to increases exponentially, with the additional increase in levels of responsibility assumed, should have prevented this internal oversight.

To counter the dysfunction and poor structural variety internally to the firm, subtle changes were introduced: It was no longer compulsory for all staff to participate in the internal learning and iterative sessions, but ensuring that the invitation remain open to all those willing to engage in the process. This element was never "policed" or enforced, and instead was left for indivuduals to incorporate this into their routines (i.e., a form of self-regulation).

Attractors in the landscape

In reviewing the attractors within the landscape, and more specifically those identified (Lack of skills; BEE; Innovation), provided important feedback. The notion that innovation would remain a key attractor in any market, seemed challenged in that, after years of preaching and positioning such innovations, the firm received little support from the market. It appeared that the local view on innovation, somehow expected such only from trusted or reliable brands and sources, both of which we did not enjoy as yet. The fear or lack of innovation however was not only evident in our direct experience, but could be observed across the public sector and to a degree the private sector as well. This trend presented a dilemma since our very value proposition was embedded in "innovation". Project experience revealed much talk about innovation and entreprenuership, but have very little done to support and promote it in practice. In some instances, people and organisations have deep-seated fears for such change, despite its obvious value proposition (e.g., the

national shortage of low-income housing, requires great innovation, yet organisations that promote efficient and rapid solutions have virtually no success in the market).

Lack of skills (experience and qualification)

In reflecting upon this aspect, the concern leaned toward the deep lack of experience, and much less upon qualification. Project experience suggest there are in fact a decent supply of qualified human capital, the problem however was that they mostly lacked good, consistent experience, which is what truly impinged upon all businesses, enterprises and programmes of delivery. From the firm's viewpoint, it was apparent that both the clients and competitors predominantly also access the same pool of talent that we do, consequently revealing itself as a national problem. It became prudent to take a long-term view of the problem since all our short-term attempts (including head-hunting), had largely failed, and was fast becoming very costly (e.g. a double master's graduates, with little experience commanded astronomical salaries, yet having very little impact on the delivery of the projects). Two key decisions were taken in this regard, one being to start our own internal "recruitment engine" dedicated to search and find appropriate human capital that would enjoy a greater fit with the culture and vision of what the firm promotes.

Secondly, we started an internal “incubation programme” whereby we take on trainees, sponsoring their education, whilst exposing them to the back-office and in some instances, projects of the firm.

Black Economic Empowerment (BEE)

In general, the response to empowerment imperatives, by the market had been met with varying degrees of resentment and skepticism. The earlier debates and application on the subject, supported and refuted many of the two opposing viewpoints. However necessary this may be, we consciously decided to remain fixated upon, and position our technical competence. But adopting this view, ignored a number of realities that we were ill aware of, like for example, the resistance toward empowerment from those organisations and firms currently enjoying the “head-start” (established firms and brand names having cash reserves; experience of running and building a business; and strong customer relationships). The creative ways and techniques of those in the private sector, to circumnavigate and avoid in some instance, BEE obligations, remain an amazing example of human creativity. The first few years of empowerment saw a myriad of superfluous and often abusive schemes of empowerment, which may in part be a natural and even necessary consequence to such a social re-engineering exercise. The limited progress regarding empowerment and transformation in the private sector, took the issue from a policy level, to the creation of more robust guidelines (the various Black Economic Empowerment charters). Having retained a deliberate focus on technical excellence, we

were concerned about the entrenchment and relationships that the older more established organisations enjoyed in the market with an alarmingly prevalent long-term contractual lock-in (Williamson, 2005). This type of subjugation and domination reduces variety and overall fitness of social systems since agencies that enjoy such lock-in are not under pressure to innovate, or be creative, and therefore cannot pass onto their clients the potential increase in variety.

Innovation

The importance of innovation as a key attractor, is embedded in the notion that it feeds efficiency, creativity and drives development of our institutions, products, and services. Having done research on innovation, suggest that in many instances, innovative products and techniques often do not see success for reasons that are purely non-technical and possibly more related to marketing and strategic positioning (e.g. Betamax versus VHS video recording technology). Since we were selling a model solution, that not only contains a great deal of innovation, but also helps to unlock it, presented a challenge. Upon reflecting on our approach when engaging potential clients we realised that all clients, found the constructs very interesting and were keen to listen, however, their enthusiasm seldom translated into closing any sales. The problem it seemed, was that we "lose" our potential clients when talking about systems theory, and complexity science. They find it very interesting, but somehow cannot see how the rhetoric would help their business and resolve their issues, with

some even remarking that this seem to be a very “academic” approach. In response, we diluted much of the complexity terminology from our paperwork, discussions and marketing material, and instead incorporated much of what the general client base, were accustomed to (e.g., efficiency; programme management, project management, business process engineering), since these were terms and conventions clients were comfortable talking about. A small change was thus to talk clients through the work using more conventional terminology and references.

Another change introduced was the use of more diagrams and maps when engaging potential clients, as well as in our reports and paperwork. The graphics provide better support when discussing concepts and issues (e.g. business integration, systemic influences). The power of maps and diagrams far exceeds the ability to express what can be conveyed through words or conversation, particularly when the client base are under pressure and tend to “skimp” through thicker documentation. This may also underscore a number of prevalentt notions such as “skilled incompetence”; “pervasive laziness to learn”; “ease of maintaining the status quo”; “self imposed limits reducing variety”; and “the average management Habitus”.

Uncertainty and emergence

The input into the overall marketing and sales strategy and subsequent activities relating to notions of uncertainty provided some of the insights below:

Retaining a positive mentality and efforts on control

Retaining a sense of impending success, proved to be a powerful mental support mechanism. Believing in the firm's service offering having intrinsic value, and turning the energy and effort from areas where we had no or little control, to investing these in refining our approach, our models, and our interaction with partners, clients and other stakeholders, reaffirms that the value proposition remains relevant and needed, and that success is merely a function of time. It also underscores the need to be outward and client focused, whilst being able to "de-personalise" expectations and outcomes that are uncomfortable, unwanted and unwelcome (e.g. loosing tenders despite being extremely competitive). This view, in retrospect seem to relate to Hoebeke's (2000) notion of "domains" of interaction across various work systems, process levels and levels of recursion. Forcing positive outcomes from such dynamicism is thus irrational, instead a positive mindset and looking for patterns and lever's of influence appear to be a better use of resources, as opposed to investing it into "controlling" outcomes. The firm's sales team far too often receive information from second and third parties, which they tend to strongly rely upon; not appreciating that such sources lack real intelligence and tend to contain vestiges of disinformation and even misinformation.

Therefore, a key lesson learned, was that whilst scanning the environment is important, the sources from which one obtain intelligence is often fraught with inconsistencies.

Changing our view of a sales event

The view of a sales event as an opportunity to create value, and an expression of innovation was originally counter-argued as a creative attempt to hide from pursuing traditional, quantified sales targets. However, with increased testing of the notion, the relevance and calming effect of this position seemed to work. Furthermore, it distills the belief that a client is much more important than the immediate revenue they may represent. This notion being tested under the strangest of conditions (e.g. taking an assignment knowing that we will run the project at break-even; taking projects that have a small profit yield; working under abusive sub-contract arrangements). The belief that once we are in a live project environment, it becomes much easier to convince the client of the value proposition, had been tested under various guises, and in almost all situations, resulted in increased revenue from these projects and clients, cementing the positive outcome of this seemingly simple proposition. This realisation became much more pronounced when taking a deeper look into where the growth of the revenue actually came from, the review showed almost seventy percent of new business had arisen from the current client base; or were referrals from existing clients. Additionally, the insight and opportunity to implement and test our models in new areas, increases our reference sites, and provide gains in intellectual property and experience that are invaluable.

Discerning between long and medium term cycles

This aspect remained difficult to judge and evaluate, however, retaining this view ensured the sales team remained focused and intent on looking for gains over a shorter-term period. The ability to clearly distinguish between short, medium and long term remained difficult, resulting in a reciprocal difficulty to the adherence of the principle. This problem seemed to be more apparent among the less experienced team members, with their sales leads being biased toward longer cycle possibilities. Additionally, the inability by some team members to differentiate between these cycles had a debilitating impact by virtue of their efforts not being rewarded within the expected timelines. Another reason for team members gravitating toward longer lead cycle opportunities, can be traced to the larger project values that were attached to these possibilities. Usually the larger the tender the more time is required to prepare the tender documentation, evaluate and award it. Generally the large tenders had an additional risk as they are highly "publicised and politicised" often resulting in huge delays, cancellation, or re-starting of the process (some tenders are released three to four times over the same amount of years, thus a costly exercise for any organisation).

5.2.2.5 Summary of research cycle 2

The experiences from the 2nd cycle, reaffirmed improvements regarding project delivery and intervention understanding. The challenge regarding

various levels of adoption and absorption across agents and agencies of systems understanding and interpretation, was sought to be overcome by the use of “simpler” or layperson language, and much more diagrams that puts into perspective the core of the text documents produced for clients.

Despite these efforts, the notion of making systems science “simpler” appear impossible since language itself is a problem in the local context (11 official languages), whilst the essence of systems constructs could be “lost” in trying to over-simplify. Adding to the transfer of systems skills is the “laziness to learn”, which refer to common instances whereby important projects documents produced, are hardly read by participating officials, whilst the opportunities of “learning-by-doing” being equally absent due to the lack of participation by officials on projects. This may support the embedded Habitus of agent and agency (Bourdieu, 1995), as well as Quinn’s (2004) state’s of leadership that appear to be perceived by agents, on the average as belonging to structural hierarchy and senior positions. The interplay of the self imposed “glass ceilings” and the mechanical structure of social systems makes it more difficult for agents to embrace change, and tend to confirm Hoebeke’s (2000) note of the disconnection between management versus worker; between consultants that drive projects externally versus the absence of internal participation.

The request by projects (e.g., Vulindlela; OAG) to provide support in terms of business processes, required deeper levels of resolution be developed for the prototype.

This requirement dictated more formal, rigid and systematic type guides and tools, i.e. a hard systems oriented content as the lower levels of resolution are linked to practical and task driven activities, needing clarity and support for the many formal rules, regulations and bylaws, much like Checkland's Systems Synthesis and Systems Analysis that require both hard and soft system elements.

Importantly, the lack of agent capacities across all interventions regarding communication, team work, and creativity was pervasive, supporting research findings of Cowen and Kolb (1995) regarding the low variety in local managers on these specific issues. Considering that sound management and problem solving proficiency are practically vital, and if absent impacts the competitive ability of both agent and agency (Bagayoko, Kelly and Hassan, 2000), much like the internal turf battles experienced between the managers of the firm itself. The pervasive inward management style of local agents, although having relatively high qualifications, highlight elements of skilled incompetence (Argyris, 1992), like the various leadership viewpoints from the many OAG incumbents. Importantly agents seem to have an innate belief that leadership is reserved for rank and position, abdicating leadership for the comfort of not being accountable. It may also be that, the higher order thinking needed to deal with uncertain positions and chaotic environments (Kirkwood, 2000), are simply absent, or not being cultivated locally.

Similarities regarding the “worlds of the client and designer”, surfaced upon reflecting how the firm could have saved much more time and ensured a greater pace of delivery, which had been caused by implicit assumptions regarding internal training and controls made as designer/researcher. An outcome that highlight the subtleties of implicit assumptions that manager can make.

Another insight related to third party interfaces and the additional management effort it consumes due to a range of issues like: disinformation; competitive tensions; client interface (CRM) functions; and contesting for revenue between consortia members. The “IMT” project executed in partnership with two of the largest international management and financial services companies, where the “competition” for project control and the valued client relationship accompanying the position, is a good example of vendors competing for project control. This seemed common to joint venture projects, often creating heated debate and unhealthy friction. In such circumstances, it was decided to play the “junior” role, removing the threat of being diminished or even ejected from the project, besides the real focus was project experience. These lessons highlight the assumption that competition is healthy since it increases “fitness”, and whilst this notion is not being questioned, it seem that relationships and access to influential decision makers are highly under-rated. A direct consequence to the blind pursuit of increased revenue and sales, tend to translate into vendors “selling” whatever the client believe

they need, or whatever the vendor prescribes as being needed (e.g. software modules in Vulindlela). Although the nature of any private enterprise relies upon profit for sustainability, often the manner in which such objectives are achieved, are abusive and floutes governance. The Vulindlela project also surfaced ethical difficulties, whereby vendor/s push a certain solution in order to maximise financial gain, like selling and positioning costly technology. Reflecting upon this and similar cases, it seem that agents and agencies ethical practices in a classroom context appear to be very different to those in real life where monetary and power aspects are attached to decisions. The Vulindlela project, where as researcher, disclosing the software license cost saving and diversion of funds cannot be claimed to be purely emancipative, since the lobby groups of those having vested interests does have an impact on decisions, and may relate to forms of Habitus, like that cited by Stanton-Salazar & Dornbusch (1995), where social capital in terms of communicating valuable information, are used as leverage, which may be subconsciously why the firm disclosed this. Emmison and Frow's (1998) insights on bourgeoisie information communication technologies can also be seen, whereby the primary contractor had the only software engineers of this specific application, thus entrenching themselves and ensuring their power remains intact. These instances in turn revealed Dolby's (2000) view on cultural aspects, whereby the primary "white" contractor of Vulindlela, and our firm team members were constantly trying to "outperform" each other, requiring concerted effort to manage.

A difficulty in cycle 2, already prevalent in the first cycle, relates to how clients reduce the implementation plans, despite articulating and presenting a robust intervention (OAG; IFMS). Service providers being commercially driven, have a dichotomy when having to balance the need of revenue (profit margins), whilst ensuring the best or optimal solutions are implemented (risk of brand exposure), and usually result in various a forms of compromises like: diluted intervention outcomes; cheaper, less experienced resources deployed by vendors; clients changing the implementation plans. This had been evident in a number of projects where client's radically alter systemic planning, displacing it with elements the client believe to be necessary, hinting at skilled incompetence; poor leadership; lack of variety and deeply rooted Habitus, which is difficult to overcome in a practical context since it moves the problem into the space of wicked or messy-type situations. In terms of trying to understand this dilemma better, it became prudent to review underlying reasons for this feature, as many departments return budget to the National Treasury, at the end of each financial year in terms of the Act (PFMA). Another consideration was government's apparently high spend in terms of hiring specialists and consultants, frequently appearing in the national media, with much of the debate hinging upon excessive costs and dependencies upon external support. Such perceptions may contribute toward making officials anxious and sceptical to adopt integrated planning and delivery. Although these views are tempered in terms of skills development, skills transfer, and specialists needed by various departments, it does impact

project delivery and execution. Reducing implementation plans therefore seem to touch upon both the budgetary planning process (lack of diligent planning and projections for a few years in advance, to ensure meeting of departmental commitments); and the capacity to lead, measure and monitor (which if effective, could reduce various abuses).

The prototype improvement after cycle-2 surfaced the parallel or dual planning and implementation techniques, espoused in typical action-oriented research and feedback loops in systems science. Incorporating this improvement into the implementation model, implied that, whilst planning is vital, it is still a probability, meaning whilst it may have moved from thinking or a thought in one's mind, to being transferred onto paper, it still has not experienced the dynamicism of implementation. Since the model recognises the dynamic nature of systems, and that any plan will always contain many implicit assumptions, live intervention feedback becomes essential, to mitigate prolonged and wasteful planning which can never totally reflect a live environment. The action and feedback of any plan is what reveals the efficacy of that plan. The prototype suggest baseline planning be enriched via constant implementation feedback, in order for the planning to remain relevant and embedded in the dynamic sub-system interplay. In the practice, it requires immediate and constant feedback to replicate the dynamic of real life situations. The OAG project proved very successful in this regard, where the client was advised to be less focused upon delivering a "perfect" accounting policy (e.g. policies

dealing with grants and donations received by State employees), and rather to publish the policy, and use the feedback from the implementation of the policy, to refine the policy itself.

Despite the client's initial resistance to this plan, the strategy provided for greater project traction, and much wider support as stakeholders could see how policy changes affected them, whilst they were obligated to provide implementation feedback regarding challenges they experienced. This improvement is similar to the cyclic nature of action oriented research, but importantly was positioned in context of "learning-by-doing". A difficulty in executing this aspect comes back to the client's internal capacity to adhere to deadlines and commitments. Also, when articulating this approach it seem to be interpreted as "academic" and "unrealistic", despite outlining exactly how and when such feedback can be introduced and regulated. The experiences suggest that ultimately, officials tend to use the lack of capacity as an excuse for various shortcomings, even when alternate innovative options are tabled, these are also dismissed because it requires officials to do things differently, which in turn seem to elicit fear of doing something wrong, such as transgressing internal boundaries or regulations. Such positions produce delays as officials tend to want to have "insulation" against any potentially negative outcomes of their actions and decisions. Ultimately, it can be reducible to a few key issues officials seem to struggle with, such as a general fear of accountability and leadership; limited understanding of their own operations and support networks;

inability to relate to internally generated delays that contribute to the lack of service delivery.

During cycle-2 of the research, the need to “displace and enhance” the current “standard content” of the strategic architecture, with that of Askoff’s “pre-emptive planning” became clear, this observation being based upon theoretical research and the practical project challenges. Typically the visualisation and pre-emptive capacity of the prototype, provided for the predicting of bottlenecks and potential problem areas (e.g. RBEB project having a preponderance on strategy and planning, versus actual implementation of the planning already conceived). A challenge regarding the pre-emptive value proposition, as a service provider, is to allow clients to pursue an avenue knowing that it is not the right approach. Similarly, the N2 gateway project suffered irreparably when the funding mechanism collapsed as predicted. The challenge it would seem, resides in the fact that as intervention leaders, the mandate by clients, to advise, inform, consult, and implement, does not have powers of enforcement. This implies that, as a firm (vendors) who are paid by clients, are unable to compel clients to adopt all the elements as contained in the proposed planning, resulting in client-directed amendments, without these clients having depth and width of understanding relating to implicit organisational and value chain assumptions surfaced via the prototype. Although these gains may not be truly appreciated by clients, it does appear to have merit in supporting pre-emptive alerts.

When looking at the internal operations if the firm, the propensity to make implicit assumptions is not unique to the client environment, and as a start-up business, the firm also needed to use resources as efficiently as possible.

The example of multiple-tasks executed by one person, also reflected client realities within the firm whereby planning and practical support requirements (e.g. back office training needs), had been ignored for a long period due to cost considerations. The lack of resources therefore seem to play a fundamental role in maintaining integrated planning, into the operations. In the case of the firm, limitations tend to be overcome by innovative techniques and ideas, but it may frequently imply, “cutting of corners” to save precious resources, which in turn raises the question “is this so different to that of the client environment?” The clients also have limited resources, the scale may be different (i.e. the quantum may differ, but the prevailing logic is similar). The notion of entrepreneurship and innovation tend to be applauded based upon survival of private sector firms in testing environments, yet integrated planning can often be seen as prohibitive (e.g. it may require expert resources; expensive equipment; monitoring and evaluation of the value chain). This concern questions the extent of “innovation” usually expected, when faced with resource limitations (i.e., innovation can only be expected to provide finite relief, and as such may be insufficient during project implementations). As a consequence to this, when does the notion of innovation extend beyond its limitations and infringe upon quality assurance, and sound governance.

Furthermore, are these tolerable limitations different for large and small firms, or public and private entities? These questions may not be an integral part of the research, but implementing the prototype across the two "worlds" revealed the question to be valid as it may add to the discussion that, we tend to have different yardsticks when measuring public and private sectors (i.e., the public sector is derided because of its lack of innovation and slow pace of delivery; whilst private sector is applauded for having such apparent capacity?). We tend to make these judgement in the absence of understanding where the innovations in private sector are derived from. The media often reports lack of corporate governance in private sector, could this be a portion of the hidden cost under the banner of innovation and creativity?

A similar issue emerges when looking at the revenue and sales question under the internal operations of the firm. The notion that the market will reward those who offer services and products that are innovative, technically superior and having delivery capacity, seem to be challenged in practice. The experience reveal the conclusion of a successful sale hinge upon more than having technical capability and competence. Although the prototype recognises the multitude of sub-system dynamics in concluding a sale event (e.g., technical ability, innovation, marketing, research and development, attractors in the market), the local environment suggest a strong propensity toward having "relationships", usually called customer relationship management (CRM). The notion of "CRM" seems to imply

having some form of “trusted network” (usually comprised of friends, colleague’s, business partners, trusted relationships). In some contexts, it may even imply having a more intense or strong relationship with a potential client. The range of interpretation touch upon ethical boundaries and sound governance. The firm’s experience suggest being mindful of all sub-systems impacting the system-in-focus (in this case, the firm’s revenue and sales), and proved challenging to allocate resources to the sub-systems (R&D, Sales; Marketing and CRM), since any one, or combination of these elements may result in the desired outcome. Complicating this observation, was the positive results regarding the provision of strong technical performance at project levels, which were the primary reasons in the growing the firm’s revenue during cycle-2 of the research. This concur with the notion of “retaining a client, is much easier than obtaining a new one”. In summary therefore, it would appear that closing a sale in a short a possible time frame, seem to be enhanced through having good “networks”, whilst retaining clients seem to be easier when value is created and technical performance are made tangible to clients.

Regarding the prototype, cycle-2 resulted in growing the deeper levels of resolution, including improvements in model content, by adding and improving upon diagrams and maps. This was needed to assist implementers (firm team members) with an increased improvement in understanding. The basic prototype remained intact, with improvements being in content of deeper levels of resolution. Another outcome of cycle-2 was the use of diagrams to enrich reports and client documentation, since

the use of systems and complexity terminology in documents, presentations and reports, appeared to have a “disconcerting” influence, across clients, implementation partners, and newly recruited firm staff. With a concerted effort not to overindulge in the usage and adoption of systems terms, it appeared that overall project and consortium-team communication tend to suffer adversely due to conceptual misunderstandings and interpretations. This was supported from our sales and marketing efforts, with feedback where potential clients were confused as to, what our sales team was in fact “selling”.

A review revealed that the sales team, when presenting the firm’s service offerings, tend to sell the “prototype”, as opposed to the value of what the model may mean to the potential client e.g. overall business integration improvements, lowering cost structures, improving and refining organisational processes, rapid delivery, efficiency, problem formulation, and highlighting bottlenecks in the extended value chain (EVC). The use of systems language tended to create discomfort and confusion to many of the stakeholders external to the firm, like client staff and other vendors collaborating on interventions. Whilst the systems language provided for an informative and learning oriented organisational culture for the firm itself, it can produce “negative” effects. This may be the result of system terms and conventions being interpreted as academic; it may be perceived by some as a threat, seeding dilution of their leadership, status, and power relationships; superficial commitment to skills transfer by most agents also diminishes the learning aspects.

5.2.3 Action research cycle-3

5.2.3.1 Data-warehouse (Vulindlela)

Review of decisions

This project represented tangible value, as the redesigned solution was more inclusive, consultative, and accomodated much of the theoretical integration, into an ongoing intervention. The success of the project resulted in it's conversion into an annual contract focused upon maintenance and minor software development work. As a firm, we have subsequently partnered with the primary contractor on other opportunties, supporting the notion of value add from a prototype and firm perspective.

5.2.3.2 OAG - Financial Management improvement Programme (FMIP)

Review of decisions

The latest Accountant General (the 4th incumbent covering our intervention tenure), moved the programme backward, having leadership adopting a passive and re-active implementation orientation, reducing the pace of project traction. Most of our project team members were asked to take up fulltime official positions in the client environment whilst efforts of the team was directed at maintenance, skills transfer and an exit plan for our team. The latest OAG incumbent surfaced a variation of "skilled incompetence" whereby project team ideas, plans and exit documentation was hardly

accessed. Perhaps it underscores the practice whereby newly recruited managers wish to “lay down the new law” or assert themselves as it were, relating to power issues (Habitus). Upon reflection, his abrupt and predetermined views on the department, may also stem from the years of perception that “consultants were running” the department, and wished to assert his new vision without delay and resistance. However the importance of insititutional capacity, radical implimentation reduces variety, and even though the client recruited more than 12 of our team members, it was in fact the integrated thinking, and systemic-based planning behind the intervention that was the key driver, not individual agents or team members. Furthermore, to arrive and immediately have vastly different plans and strategies imply that such an agent would have spent sufficient time and preparation into understanding the environment, which may have been the case?

5.2.3.3 Royal Bafokeng Economic Board (RBEB)

Review of decisions

The central management office (CMO) was a success for the RBEB, creating a great deal of enthusiasm and support from the local SMME’s. Despite the positive outcome, the leadership/CEO of the RBEB became involved in unprecedented political debate within the larger Bafokeng structures, mostly due to increasing popularity of successes, and the eagerness of the CEO, to institute the same processess, governance and

procedures of the RBEB, into the other organisations of the Kingdom. His eagerness to have similar transparent governance instituted across the group structure, made him very unpopular with the more established sister companies, fueling distractions and politicking upon our exit. This may be a very good example of having an emanciaptive disposition, but are prevented from implementation due to turf battles (Bagayoko, Kelly and Hassan, 2000), whilst it further supports the lack of requisite variety at board levels in SA.

5.2.3.4 Internal operations of the firm

Review of decisions

Ratio of tenders and proposals

It was evident that submitting proposals without any previous knowledge or insight into the client environment, or some sort of customer relationship, reduce the chances of success. This reality hold much implication for start up businesses in general. Although there is a strong legislative and legal framework of incentives in this regard, much of the institutional support lags in terms of enabling this national developmental vision. Both public and private sector agree that SMME's are essential in unlocking growth potential for the country (innovation, job creation, socio-economic integration), however the experience indicate the necessary support mechanisms are not in place to ensure compliance to this intent, and

brings to the fore the government's national lack of variety (procedural, structural and substantive variety). Typically access to capital, contracts or work opportunities for the emerging class, are much more difficult than most of the policy-makers and political commentators seem to appreciate. Additionally the protective measures adopted by established firms regarding clients and their ability to entrench themselves into various client domains are possibly the most threatening, acknowledging Williamson's (2005) long-term and contractual-lock in strategies covertly perperated by large firms. Such practices are "socially unfit" since it reduces variety, stiffles creativity and innovation, by negatively affecting both agents and agencies (no real competition; serves to retard the propensity for change; creates unhealthy monopolies; create barriers of entry to emerging agents and agencies; artificially informs costs; and maintains complacency).

Competing in such a context, where the "game" is not strictly speaking rigged, but loaded in favour of certain classes of agents (Bourdieu, 1991, 1975) remain highly under-estimated. The ratio of success is clearly enhanced through established branding and effective customer relationships, both of which takes a great deal of time and effort, and usually too costly for SMME's to engage in, as they remain in "survival mode" for long periods in their early life-cycle. The firm still pursue smaller opportunities, whilst going for the larger opportunities in partnerships with larger firms, whilst the firm are increasingly requested to respond to tenders and proposals, and have slowly secured tenders in environments

having no prior relationship. This suggests the internal strategy to be sound, and despite the hard work ethic it implies, seem to have begun the process of building a fledgeling brand. However, when considering other SMME's which are often invite to participate in tenders and project executions, it is clear that they are not aware of these conditions, and as a result, do not appreciate such investments and strategies. This is not because they cannot relate to the plan and logic of the measures. Instead it appears that these agents and agencies have a blind belief that the policy environment (BEE policies and charters) and Customer Relationships, alone will provide them with sustainability and success. Efforts in explaining the larger systemic attractor landscape tend to fall upon deaf ears. This may be so for various reasons, of which a common one is a mindset that color alone is sufficient to create a viable business, almost a sense of entitlement, which defeats the very purpose and grounding of BEE policy measures. Also, the "first wave" of empowerment deals have had a profound impact upon the prevailing mindsets and expectations from empowerment and affirmative action. The early models of empowerment saw a few individuals make huge successes in a very short time, creating the impression that indeed this is a standard in business (that wealth can generally be created over a very short time). Some believe it vital to create a black upper-class, regardless of the relevance of such views, it seem to generate an unrealistic expectation from emerging black SMME's as their benchmark is based upon the limited but high-profile mega successes. In contrast, our experience has been the

antithesis, and although anyone would welcome rapid success, it must be acknowledged that sustainable success, on the average comes from continuous investment into technical excellence, and much patience, as opposed to investing all energy and effort into political support and favour (CRM). In terms of the prototype, the practice, and general systems theory, this is tantamount to focusing upon one of the elements of a dynamic system, at the expense of neglecting the range of other equally important elements within the system. Such perspectives and attitudes generate the pervasive lack of higher-order thinking needed to navigate complex social systems (Kirkwood, 2000).

Focus on low-hanging fruit

The experience confirm that success of a sale hinge upon multiple variables, when seen as a system-in-focus. Efforts and plans should be alert to short term opportunities, irrespective of the size of the contract, which can result in an overall positive effect, particularly for emerging SMME's, whilst carefully nurturing the medium to longer term opportunities. This view may relate to the importance of cash flow, and much less profitability as such. Viability of the firm does not imply high turnovers or large contracts, yet for some reason the entire sales team of the firm gravitated toward larger contracts which usually require more investment. Perhaps as designer, researcher, having limited entreprenuerial skills introduces bias, but having a successful outcome by being intently focused on the shorter-term opportunities does seem to help retain a positive

outlook, which in turn grow the confidence and relevance of the intrinsic value proposition offered. A postive mental attitude seem to be reinforced by the development of one's "gut feel" (the feeling ascribed to making a decision based upon information, other than technical or factual reasons, or reasons that are not perfectly clear at a specific point). The development and improvement of one's own intuition over years of practice may be difficult to quantify as an emergent phenomena, or even as a skill, due to the difficulties of its defining qualities and vague proposition. Perhaps such sentiments do not belong in this body of work, however in the spirit of complexity, the improved capacity to sense how long it would take to convert any opportunity have become something that a few senior partners have become reliant upon. Whether this improved ability is based upon the firm's experiences, the models or even it's mental maps and systemic diagrams, may never be sufficiently proved. Regarding the non-performing team members, it could be that their absorptive capacity may not have been sufficiently deep so as to build the needed variety? Also the manner in which self regulation and related "freedoms" were allowed, may have been too much to deal with, much like "environmental noise" driving them to distraction (Thompson, 1967), and also relates to the feature that Ashby's Law of Requisite Variety extolls, whereby agents need variety to absorb variety (Ashby, 1956).

Multiple role-playing

Although still effective after a number of years, it became one of the most challenging aspects to maintain. The reasons for this feature may be embedded in the notion that such efforts are predominantly entrepreneurial, and requires passion and drive that does not necessarily reside in staff being recruited post the construction of a decent operating platform. Attempts to introduce incentives (share equity, bonuses, performance incentives) have also not worked as effectively as expected, often creating bigger problems, such as fundamental changes in agent behaviour; inter agency power plays and internal politicking. Another reason for this may be that the level of maturity required from such candidates are lacking, notably shallow and limited understanding of running a business and particularly the cash-flow aspects were not appreciated (e.g., the net proceeds or profits of a completed or partially completed project are invariably used in the starting up of newly secured projects). As researcher and designer, my view that given the opportunity, any agent may free himself from various forms of subjugation may not necessarily be refuted by the overall lack in performance from the team members of the firm since it is well known that small or large teams, and institutions (Capra, 1996; Homer-Dixon, 2001), require agents and agencies to cultivate such integrative, systemic understanding. The time agencies can set aside for agents to “learn and adapt” may be the bigger obstacle in the sense that as profit-based entities, extensive investment into agent training and development, introduce risk (e.g. loss of staff; head-

hunting from competition; resignations by executive staff to compete in the same business, often taking clients with them). Thus for emerging and small companies, the risk of such investments are high, although from a global perspective, the richness of competittion and growth of individual capacities are difficult to argue against, especially from an emancipative view. In this context, at least seven team members of the firm, have since started their own succesful businesses, and have even resulted in partnerships between the firms.

The multiple role-playing is a key mechanism in creating savings and lowering overhead costs as it relies upon multi-tasking by agents that provide efficiencies, and effectiveness, usually driven from “sweat investment”. The difficulty in cultivating this mindset across the organisation, suggest we cannot expect all staff to operate in this fashion, and that some agents neither respond to, nor appreciate this part of the firm’s strategy. From a self regulation perspective, this outcome was a disappointment, since the experiences that it may potentially unlock regarding overall business understanding, personal learning and adaptation, are lost to those who remain in comfort zones. Knowing, seeing and experiencing the various aspects of any business (from marketing, to accounting, and delivery of projects) enhances understanding and builds an improved intuition. It was never expected that all people must be able to do all things, instead all staff were encouraged to learn and expose themselves to other functional areas. The negative

outcome in this regard may hinge upon a few areas like: too little time spent internally on training and change management; little or no individual commitment to their own dreams and aspirations; fear of uncertainty to undertake new challenging tasks, supporting the deeply rooted Newtonian management style in seeking the comfort of mechanical certainty (Freedman, 1992).

These factors are noted since as desinger/researcher, a creative and innovative working environment was my theoretical ideal, revealing both my Habitus, and emancipative desire to impart systems ideas, innovation and continuous learning. It would appear that this vision is readily embraced by virtually all entrants into the firm, but only a few call upon their capacities to implement it, or to take small steps toward its attainment. Instead, an alarming number of agents within agencies prefer: equilibrium; having neat delineated processes; and predictablity since these mechanical notions provide comfort, whilst complexity and chaotic environments serve to perplex, confuse, and make agents uncomfortable in unfamiliar settings and conditions (Casti, 1994; Crutchfield et al, 1986).

Attractors in the landscape

Lack of resources

The dire lack of experienced resources, coupled with the strong competition for such a limited resource pool appeared as a double-edged

sword. In one sense, it represents opportunity for the procurement of external assistance, i.e. potential contracts and revenue for various vendors. On the other hand, securing such project work and opportunities imply that the successful firm actually have these resources immediately available, which is obviously most of the time untrue (no organisation have expensive resources, sitting by idly waiting for a project).

Whilst we have developed techniques of alleviating this problem (e.g. a good recruitment engine; strong network relations; innovative deployment models; reliable partnerships with other firms), it still represents a problem for most organisations. The firm have lost many resources to other larger firms (through "head-hunting"), particularly those skills from a previously disadvantaged background. We also experienced human resource losses to some of our clients like for example the OAG. The local and global landscape it seems, will thirst for experienced resources for a long time still, with some of the best efforts of staff retention being challenged by real world dynamics of better prospects and incentives elsewhere.

Black Economic Empowerment (BEE)

The national empowerment drive remain challenged, the private sector, public sector and State Owned Enterprises (SOE's), have not had the desired effect in terms of creating a sustainable emerging class. The South African government embellished the BEE drive with a great deal of new legislation and charters that has been tabled to enhance the BEE programme and eliminate both the bad practices, as well as expanding the

narrow interpretation of the initiative. From a systemic viewpoint, the importance and relevance of the BEE is obvious, and support national objectives such as greater socio-economic harmony and integration. The manner in which these policy measures are managed and implemented suffers from a lack of variety, for example: ever more detailed policy mechanisms, yet having weak structural and substantive variety to enforce and drive the legislation.

Innovation

Innovation is important since it provides a rich learning platform and challenges our thinking and our models, elements recognised as vital in knowledge management (Nonaka, 1991). The fact that clients or the market may sometimes not appreciate innovation for whatever reason should not distract from such commitments. The team members of the firm, as an example found the knowledge repository extremely useful to access our White papers; Research & Development papers; Project Management Templates; Tender Responses; and Tender Proposals. The knowledge repository internally to the firm appeared to be much more useful and valuable to firm members, but may be so due to the very nature of the firm. However client repositories, left behind after project implementations are hardly accessed. This may be that it is not sufficiently integrated to their websites or internal ICT infrastructure, making access to the information contained therein challenging and problematic in terms of locating it

conveniently and to create the ability to adapt faster (McAdam & McCreedy, 2000).

Limited control and the mental approach

The concept of uncertainty is disliked by all of us, yet it is a funamental part of life. Attempts to control and have certain outcomes in the context of social systems serves only to frustrate and speak to our globally pervasive Habitus of wanting and needing certainty. We gravitate toward the familiar, and try to avoid the unfamiliar by virtue of our strong mechanical oreintation (Freedman, 1992), yet we are aware that higher order thinking and multiple interpretations aide agents in terms of finding order within seemingly chaotic environments (Kirkwood, 2000), whilst creativity help to grow individual cognitive capacities in dealing with the complexity of dynamic processes (Thompson, 2003). This is indeed a pervasive challenge and a strongly embedded Habitus, and in context of the firm, despite the probabilistic context of a sale event, recognising that there are simple ways and techniques that allow for an increased understanding through patterns and emergence, have shown great potential to avoid the many traps of certainty and the stress that accompany the need to have predictability and absolute control.

Changing the view of a sale event

The internal change regarding marketing and sales strategy represents the most subtle departure from tradition. Redefining what constitutes a sales event (from that of securing a specific contract value from an entity; to that of securing a relationship with an entity, having unlimited potential), have yielded two serendipitous impacts in the firm. On the one hand, it relieved the team from the pressures of pursuing a blind number or monetary value, which in itself holds much trauma and pressure. Instead this had been turned into the pursuit of a single new client, irrespective of contract value. The strange result is that most of our work has been repeat work from clients borne from very simplistic and small interventions that most organisations would not consider worthy of pursuit.

Furthermore, the care, diligence and value introduced into “small” contracts, have aided in creating a name for the firm, embedded in good service delivery and performance excellence. These two aspects, and the positive outcomes associated with it, seem to support the notion of sensitivity to initial conditions, whereby small perturbations, can lead to large consequence. Also clear, is that investing time into deeper understanding, allows one the capacity to identify and focus upon the “core” aspects as opposed to “topical” aspects. These issues touch upon efficient management and goal setting (Mintzberg, 2004), as well as personal workflow processes (Robbins, 2001), which cultivate an increase in personal mastery (Senge, 1990).

Discerning between long and medium-term sales cycles

The ability to remain vigilant in terms medium and longer term opportunities, is ever present due to dynamics of complex systems. Experience suggest opportunities can be attenuated, and in some instances be "brought forward" and nurtured to conclusion. Such opportunities often exist within various environments, and usually require a little bit of creativity and innovation in unlocking the project within its domain (Thompson, 2003). This is often the case, as the reason for much of the delays are caused within organisations that are understaffed, ill equipped and consequently having little time to drive their projects to a point where external assistance can be secured.

A vital issue in such instances is to be acutely aware of overstepping governance protocols, making reference to the fact that one cannot be "referee and player" and to adopt a critical thinking perspective, so as to ensure actions taken are democratic, fair and reduce bias (Brookefield, 1987).

To remain within tolerable limits of such protocols present a very different dilemma where extreme caution is best advised (e.g. having intimate client knowledge or project specific insight may prove to be detrimental from a governance and transparency perspective). The blurring of these lines are extremely common, be it in public or private sector. From a business development viewpoint, this dilemma is quite a deep one and challenges

the notion of good governance (King, 2000), and how we tend to deal with things, when we are confronted with them, as opposed to our responses when asked to comment on something that has no or little impact upon our material wellbeing. The models generally adopted in such instances are fairly simple, but tend to assume ideal circumstances. However, much of the "right-wrong" decisions made in such a laboratory type set-up, assume a distinctly different slant when we are personally impacted, notably the various forms of capital as expressed by Bourdieu (1991, 1975), more especially when it comes to financial or monetary levels having a direct impact on an agents wellbeing. Attached to this, is the highly networked global environment and the notion of "customer relationship management (CRM)" which tend to be abused. This raises the question, when does CRM "exceed it's boundaries" since it appear to acceptable to buy potential customers drinks, lunch, football tickets, or provide other forms of entertainment; whilst activities or items of higher value (e.g. an overseas trip, a car, or a house), are condemned? – the difficulty in establishing boundaries of CRM being fraught with inconsistencies. This experience suggest little progress on the subject, other than to say that, the blind belief in an equitable free market do not appear to provide sufficient protection, and that individual trust and accountability in managing oneself becomes vital (King, 2002).

5.2.3.5 Department of Social Development (DoSD)

The Department of Social Development (DoSD), usurps of the largest chuncks of the national budget (R60 billion per annum) to manage and administer the payment of all forms of social grants (e.g., Child Grants, Pensions, Disability grants). Due to the important function of this department, as well as it's institutional and delivery challenges, the Cabinet passed a resolution to take this function outside of traditional government structures, by creating an Agency with the purpose of providing more effective and efficient service delivery. The project mandate was to develop a "blue-print" of what the Agency should look like in terms of structure, job profiles, and remuneration levels. Our client interface was one of the senior Directors, Ms. Reyana Allie. The ideal blue-print of the envisaged Agency, covered broad objective: the Organsiational and Governance framework; Detailed Human Resource Management; and IT-systems requirements; Policy and Procedural guides; and an ideal Operating model (implementation framework).

Application and Review

The prototype served this project in terms of the integration required by the client, and allowed team members to link project outputs (blue-print of the new organisation) to the strategic intent of the Agency. A familiar difficulty came to the fore on this project right at the onset, relating to how agents tend to blindly believe that technology can provide a panacea for all their efficiency problems. To explicate this to a client bent upon techno-centric beliefs of efficiency, whilst in parallel having to articulate the importance of technology is challenging, and invokes the importance of Socio-technical systems thinking aspects whereby integration and harmonisation between human and technical apsects are import.

The prototype planning supports the importance of technology, but in context of two other enablers at the same level of resolution, (i.e., the Tactical architecture that contain it's three sub-systems, of which technology is but one). Adding to the diffculty was the departmental appointment of a "software vendor" outside of our work package in a separate contract. This move was highlighted as premature and risky and was documented as such in the minutes, expressing our opinion and recommendation to the client, that this cannot be seen as a sound decision, since much work and analysis needed to happen before an informed technology choice could be made. In a way, this reinforced the hard sales and marketing machinery of the product–centric vendors, that

tend to have a strong influence when selling their wares as a “silver bullet”. In this instance, much of the blue-print requirements have been forced upon the software vendor, ensuring compliance to key elements of the blue-print, however the acceleration of data versus the intelligent use thereof, require leadership maturity and sufficient variety in order to make sensible decisions and direct resources optimally (Holmes, 2006; Mafela, 2006). Also obvious on this project was the “back-room” or “political driven” decisions from forces that are absent at project level, another bad practice prevalent in the SA public sector, whereby sound planning becomes defeated by forces that subjugate from higher levels of authority and skewed distributions of understanding (Ackoff, 1999; Toffler, 1971).

5.2.3.6 South African Social Security Agency (SASSA)

The South African Social Security Agency (SASSA), is an entity created by the National Department of Social Development, in its quest to introduce greater effectiveness and efficiency in the payment and administration of social grants. The department unfortunately had a reputation for its inability to control and mitigate corruption of the grant processes in general (incidents reported in the newspapers refer to the elderly dying in queque’s while waiting to receive grants; other articles claim millions of Rands of corruption, like for example where deceased people still collect monthly cheques?). Our client in this instance was the CEO of SASSA, Mr. Fezile Makiwane, and one of his Deputy Director Generals, Mr. Selwyn Jehoma.

The project was to focus upon one of the products or grant typologies of the Agency, i.e. the Temporary Disability Grants (TDG's). The purpose was to map the current TDG process, and create a simplified, more streamlined TDG process for the Agency to implement. The period of the intervention was set for twelve months, with core project objectives being: Review overall administration process; Develop current process maps including Provincial and Regional variations; Develop an improved process model; Implement and Pilot the new process model.

Application and Review

Having previous knowledge of the client domain allowed rapid progress, more specifically in terms of having much less resistance to share information from officials. On a technical level, this project arguably represents one of the biggest successes, especially from a process and integrative perspective. The official benchmark in terms of managing Disability grants, by the department took 128 days to process a transaction (i.e. from the time of lodging a claim at the department, to its disapproval or approval and payment). During the piloting of the revised process, improvements reduced the period from 128 days, to under 2 hours in some test cases (pilot implementations covered a range of areas and Provinces, with varying infrastructure and suppport). The improved throughput represented savings and client improvements at a most tangible level. A lesson from this project is the reduced process and response times had been achieved without using any form of technological enablement (IT

systems), it was purely process and integration that had delivered tangible project outcomes. In some instances it was necessary to redefine parts of processes, whilst the bulk of the improvements resulted from relocating filing cabinets, in-trays, and moving furniture to allow for fluid physical infrastructure to match the revised processes. Some instances the team only changed the layout of the reception areas where grant applications are made, so as to alleviate blockages and queing. This project highlighted the importance of process architecture and that fluid processes can provide as much relief as the acceleration of data through technology, without the expensive costs attached to it. This view supports innovation and procedural variety, noted by Gazendam (1993), whereby the 3 “classes” of variety are vital in organisations - structural, procedural and substantial variety. In fact technology is mostly the automation of processes and functions, which are often not appreciated. Reflecting upon this from a developmental economy, it appears that automation is favoured due to efficiencies it may bring in, but it also makes redundant certain manual work and tasks, which removes employment opportuntiies that are vital. On the flip side, it does create new types of jobs like software engineers, but in developmental economies these systemic considerations are hardly weighed in terms of practical effects and sustianability for the masses that possess lower-end skills.

5.2.3.7 National Transversal Financial System (IFMS)

As a fundamental support requirement to the Public Finance Management Act (PFMA), the National Treasury was required to upgrade its financial information technology systems, though the Department of Specialist Functions. The head of this unit is a Deputy Director General, Mr. Coen Kruger. The importance of this initiative can be seen when looking at the draft cost models for the project (called information and financial management system - IFMS). The provisional cost model for the programme was estimated between R8billion and R15billion. The reason for the wide variation was the lack of detailed information, and the inclusion of both hardware, software and network upgrades. The objective of the project was to develop the terms of reference for the new financial system for the government of South Africa, with broad aims covering: Review overall financial administration processes; Develop detailed business rules and process flows; Develop terms of reference for software vendors; Assist with acquisition process; Oversight for the implementation of systems procured.

Application and Review

A key proposal based upon our planning related to saving time and money, by sharing risk with potential hardware and software vendors. We proposed a “boardroom pilot” concept, whereby we invite Class A vendors, to display their toolsets under one roof, for a period of a few months,

allowing key stakeholders to look, feel, touch and question the vendors in a live context. The idea being that this would inform the request for proposal (RFP) or tender to be published for the acquisition of the new system. This plan would share the responsibility of the system architecture and introduce risk sharing by the various pre-qualified (Class A vendors), and importantly, demonstrate their wares and how it complies to the project objectives. After much work and effort in terms of this planning, the client declined the planning, in favour of executing and doing it all “internally”. We cautioned that the skills needed to drive this plan internally was not present within the department; and that it would require a great deal of internal re-mapping of process work, skills which were also not present within the department. Questioning why such a different plan was sanctioned, revealed that one of the project advisors whom we had appointed, was pushing the alternate agenda between himself, the official project sponsor, and his second in charge. Understanding that neither of the three agents posses the skills, experience, nor have the requisite variety to deal with such an internal programme, was an obvious cause for concern. The now very familiar “skilled incompetence” and “implicit assumptions” surfaced where agents seem to believe that they have the ability and skills to execute complex projects internally. Additionally, voicing our opinion is this regard and making a strong case for the original planning, casued our team to be “side-lined” in a manner of speaking, like for example not being invited to important meetings, making for a hostile type environment.

Adding to this dynamic was the overt and covert lobbying from various software vendors, and commercial integration firms, all proposing their ideas, approaches and uniquely suited software packages, causing even more delays. The change in planning also restricited our intervention to the Supply Chain Management component of the client requirements, needing only two of our firms consultants to be part of this intervention. Other confusing signals included opinions from agents and agencies that promoted the “open source” (free and no license software), versus those promoting the “common-off-the-shelf - COTS” software. All of these influences causing more than 2 years of delays, with no publication for a request for proposals (RFP) being imminent. A lesson from this experience relate to the scale of “customer relationship management” (CRM) techniques, to influence and access decision makers and direct planning activities on such high-profile opportunites. This is raised as an important aspect under this project since it impacts the manner in which decisions are taken, and potential opportunities are nurtured and grown. When contrasting the traditional SMME view on business development and growth to these activities, it becomes clear that the notion of a “level playing field” need a great deal of attention for any form of truth to be contained in it, capturing the “dependency theory” of ingrained poverty noted by Bond (1998, 1999, 2000) that exists in Africa. It also mirrors Bourdieu’s views on a free market and the notion of free and fair competition, which is an artefact of theory, rather than a truism (Bourdieu, 1991, 1975). It also reveal the “thin walls of governance” and the

leadership qualities needed to rise above vested interests (King, 2002), which are mostly absent from the leadership across SA.

5.2.3.8 Interim management team (IMT)

The Eastern Cape Province is one of the more marginalised constituencies in South Africa. From a political perspective, some of South Africa's most influential and powerful leaders come from this area. As a result, much attention has been given to the Province by the newly elected ANC government. Despite these efforts, the severe capacity constraints of the province tend to have a debillitating effect on variously tested improvement strategies. To this end, during 2003, the misadministration and delivery failures turned into a public outcry, with the result that the Office of the President, intervened in order to restore faith and confidence in the Province, in particular focusing upon: Department of Health; Department of Education; Department of Social Development; and Department of Public Works. The client in this instance was the Head of Provincial Treasury and Finance, Mr. Monde Tom. The overall project aim was to immediately assist all four Provincial Departments in terms of remedial action, covering: Interim administration relief and support; Develop supportive back-office functions; Develop overall strategy & skills transfer; Refine and improve the financial management aspects of the client Departments.

Application and review

The proposed intervention resulted in the four departments being shared between the intervention Consortia companies, with each organisation responsbile for a very specific aspect of the overall intervention. Our core focus was providing financial management support, which included the clearing of departmental suspense accounts (mechanism used by public sector financial management to set-aside cost allocation when unable to identify where such cost are to be allocated according to the new finance Act). This is also the core reason for the public outcry and the damning report by the Auditor General.

Working in consortiums or partnerships with other organisations always tend to result in the "bigger" organisations promoting their methodologies and templates, above other smaller or "unbranded" organisations. This is an important function since it implies a central and commanding role in terms of the intervention, and provide "power" in terms of the revenues that can be derived by firm members from the intervention. Our area of the project was questioned since it touched upon the larger, branded firm's traditional competence areas (financial management). The key in securing our work package hinged upon the work we have done, and at the time, was still doing in the Office of the Accountant General (generating policies and implementation guides for the PFMA). Having access to this knowledge and experience at the time was fairly unique, providing us an unusually strong position. The challenge on this project, was to introduce rapid reform in an environment that was highly suspicious, with officials

being resentful toward the Presidential intervention, seen as a unilateral emergency decision with little to no consultation with the affected officials and departments, making for a very coersive context.

The limited time to effect meaningful change implied that implementation teams needed to be aggressive, having less time to explain each step. Using the prototype's process architecture, aided the suspense account work in that we replicated the business rules implicit in the PFMA, and the department. The outcome of the project was successful, resulting in our team being paid out ahead of consortium members (the payment of the work was related to achieving milestones, as opposed to being based upon "time and material", thus a much more risk sharing approach, requiring firms to ensure minimal mistakes). Whilst the outputs and outcomes of the intervention was sound and relatively easy to achieve, a key lesson relates to the propensity of private sector agents and agencies, to squeeze out from unsuspecting cients, as much revenue as possible. Our project performance had been sterling, delivering upon our mandate and contract, however a few months later we learned that two consortia members have in fact used our rapid delivery as a mechanism to further their own means, resulting in these agencies obtaining additional contracts for other provinces, worth Hundreds of Millions of Rands. Not only had this been illegal since it flouted procurement rules (King, 2002), but the organisations in question used a simple bespoke software tool, and sold it into government to extract these large revenues. The core issue related to the

technology as it was not robust enough, and could not deliver on the claims that it's owners made. This we knew since our work-stream on the project included identifying the challenges with the software that was in use at the time.

The two organisations have succesfully entrenched this software that have remained in place for years already, and will be paid for over and over by government, as such being a practical example of Williamson's (2005) long-term contractual and vendor lock-in strategies.

5.2.3.9 N2 Gateway project (N2G)

The N2 Gateway project was designed to test the new South African Housing policy, termed "Breaking New Ground" (BNG). The new "human resettlement" programme aimed to introduce radical changes in location, housing typologies and encourage integration of the poorer and wealthier areas. The backlog alone, for low cost housing was estimated at 100 000 homes per province, and growing at 10% per annum. The reason for the lack of delivery being varied, cutting across the supply chain of both private and public sector. The N2 Gateway was seen as a key step toward testing the new legislation, as well as the actors that play a role across the value chain. The intention being to establish a model of intervention that can lead the way for a much more aggressive housing delivery programme. Furthermore, the political pressure from the voters residing in the "informal settlements" who are the intended recipients of the new housing schemes,

were increasingly becoming agitated with the lack of delivery. A “new” feature on this project was that we had three clients rolled into one, i.e. (the National Minister of Housing, Ms. Lindiwe Sisulu and her Ministerial Advisor, Mr. Saths Moodly; Mayor of Cape Town, Ms. N. Nomaindia and her Chief Operating Officer for the City of Cape Town, Mr. Rushj Lehutso; The Western Cape Provincial Minister for Housing, Mr. Marius Fransman), among many other senior managers from each of the three spheres of government. The project aim was conceptually an extremely exciting opportunity since it promotes creativity, innovation and setting of new standards.

The tangible objectives as set out by the intervention was to build 22000 low-cost houses, including the removal and rehabilitation of informal settlements along the N2 national road, in an 18 month period. The cost of the project was estimated at R3.5billion.

Application and review

The protoype’s notions of integration and extended value chains proved to be the most visible and important aspect of support on this project. In fact, this was purposefully highlighted in the proposed intervention strategy tabled to the multi-party client. From the onset, it was expected that the project reporting requirements would need a great deal of attention and management regarding integrated reporting to 3 spheres of government. Furthermore, the high profile nature of the project (regularly appearing in

the local news), promoted extra dilligence regarding governance protocols. Using the prototype to define the problem statement and inform the journey map of the project, proved to be an obstacle for the tripartite client, since they all viewed this project as a “construction project”, which in itself goes against the grain of the intent and strategy of the programme parameters implied by the new housing policy. This was another example of “skilled incompetence” (Argyris, 1992), and having predetermined mechanistic based solution ideas (Friedman, 1992), whereby the disconection between various groupings (Hoebeke, 2000), from politicians, senior managers, lower level engeering officials, and recipient communities were unconnected, unrealistic and based upon linear model solutions.

This project dynamic of skewed levels of understanding and authority (Ackoff, 1999; Toffler, 1971) was consequently multiplied many fold, which had been anticipated, but under-estimated prior to project initiation. Furthermore, based upon public sector experience, we incorporated an “adhoc” project team component, under the overall programme structure. Since experience in working within the public sector, clients invariably request assistance on issues well outside of the scope of the work, the mandate of the service level agreement and contractual obligations, and therefore thought it wise to ensure we accommodate such real potentialities. The strategic intent of the project was to ensure innovation and creativity throughout the value chain of delivery, which the prototype plans accomodated, covering the need for specific subject area experts,

like for example a full-time and dedicated legal expert to deal with Service Level Agreements and Environmental Impact Assessments. Furthermore, we repeatedly required stakeholders to realise that integration is vital, and that the high degree of interdepenencies across the three spheres of government, as well as the Turnkey contractors demand all project stakeholders to adhere to a very tight and regimented work ethic. Three months into the project, it became apparent that integration efforts between the three spheres of government was non-existent, having direct project implications, more alarmingly, the 3 CFO's have not secured and re-allocated their respective budgets from their respective departments, as agreed in the project steering committee meetings. Subsequent to project initiation, we were instructed by the tripartite client, that both the "Funding workstream" and the "Communications workstream" be taken out of the project office, and kept under the control and functional responsibility of the tri-partite client, more especially since this was a local a election year, making the project an ideal opportunity for the politically oriented.

Political agenda's aside, based upon experience and research, these important project functions assumed that the 3 department's possessed the resource capacity and willigness to operate under higher than usual pressure and developing innovative ways of moving around red-tape and institutional blockages known to exist. This is the implicit assumptions agents make about their agencies in terms of capacity, competence and capability that exists, touching upon the notion of the "long-route-of-accountability", which undescores the weaknesses in service delivery

attributed to the breakdown in one or all of the links along the route of accountability or extended value chain, covering Policymakers, Providers and the Destitute (Keefer and Khemani, 2005).

Documenting and alerting the client to these dangers, the decision was final, even though the inability by some of the tripartite project team members to adhere to the most simplistic governance protocols, had severe negative influences across the project already, some of which included: manipulation of minutes; attempting to direct architectural and design considerations; inability to meet promised deadlines. In order to turn this around and make the stakeholders relate to each other and the importance of integrated action, was to create a self-assessment and review of the project, earlier than normally instituted in terms of the prototype, so as to compel the client to “think and review” by using this document as a last resort, to instill discipline and proffessionalism across the tripartite client.

The major challenge on this pilot programme was really the fragmented political conditions prevalent in the Western Cape Province. The attempted manipulation from both political parties spilled into the project, creating a fluid and often hostile project environment. Despite the project office and the turnkey vendors having delivered phase-1 of the project in record time, the inability of the National, Provincial, and Local governments to operate

as a seemless whole, proved far too onerous (e.g. the three Chief Financial Officers did no work to integrate the R3.5b budget, despite being tasked to focus on this activity, for more than 9 months). Adding to the fluid political dynamics was the unwillingness from key officials to provide the promised project support and participation, which further impinges upon their already limited variety, creating the "messy situations" that serve to exacerbate the notion of sets-of-problems (Ackoff, 1974).

A key recommendation after the mini-audit and self-assessment, related to the "powers" of the project management unit, citing the need have greater and more independence as the implementing team. This reccommendation was meant to empower the project team, and obtain "powers and authority" to act and instruct public sector agents to fulfill their obligated duties, within acceptable parameters of time and quality. This had been the project's biggest threat, i.e. project-team's inability to "enforce performance" – despite being named a project management unit, the powers that are necessary to obtain specific performance from all parties were not in place. A typical example being that, as private sector project managers, we did not have any official powers to instruct the responsible government departments or agencies in the value chain, to perform their needed activities, typically say an environmental impact assessment (EIA), resulting in huge delays and delivery frustrations. This feature underscore findings that managers find it difficult to direct resources and activities optimally (Van der Vyfer, 1991).

Skewed distributions of understanding and knowledge is known to be indicators of fundamental challenges within social systems (Drucker, 1994; Toffler, 1971), and perhaps was one of the reasons why our report and recommendations were grossly and purposefully misinterpreted, leading to the setting-up of a government-owned construction company to drive the national housing initiative. This again reflected the inward-nature of the client understanding, the implicit assumptions made about agent and agency behaviour, and the stubborn leadership unable to understand what can and cannot be controlled or influenced (Leddick, 2000). The project became a national politcal "football", resulting in less delivery, blamecasting between the tri-partite client, negative weekly newpaper articles, and a huge risk as implementing vendors. Upon the change of political masters within the Province, our team was requested to table an exit strategy, and after 15 months we handed over the project to the City of Cape Town.

The protoype planning supported the project well in respect early warnings relating to problems of funding and communication challenges, whilst introducing innovations to remove or work around institutional blockages, like temprorary relocation sites and faster EIA's. Most importantly, the project governance and careful systematic documentation appeared to have "saved" the firm, in that we provided a sound and validated "audit trail" of decisions, actions and challenges of the project since it's inception. Without which, we may have been blamed for the project failure, surfacing

the importance of governance (King, 2002). Having sound advice fall upon deaf ears over a staggering 9 months (weekly project minutes and reminders), can hardly be excused. Another lesson was the extent of the capacity constriants across government structures, and the inability to recognise the bottlenecks this caused, for the most well conceived plans (Leddick, 2000). This experience tend to shed light on the practice of taking whimsical decisions, without any thought of potential implications, like for example when one of the tri-partite clients instructed the project to increase the average size of the houses from 36 square meteres, to 40 square metres. After reworking cost structures, townplanning, civil engineering impact and reticulation changes, we tabled the extra cost to be close to R400million, based upon the Turnkey developers estimates. After realising the implication, the decision was subsequently reversed to the original size, causing a 3 month delay in an 18 months project? This may be ascribed to communication shortfalls and misinterpretations be it verbal, written, intonation and body language (Pease, 1993), and the ability to read and evaluate citically (Davies, 1996), a pattern which repeated itslef in many other aspects of the project, like discussing and planning for Temporary Relocation Areas (TRA's) and Environmental Impact Assessment (EIA's) for the various precints. Gajedaghi (1999) suggests that for agencies and agents to be adequately developed, impacts both the collective and the individual. This serves as a summary of the experience whereby, differentiation, innovation and integration create feasible wholes (Gajedaghi, 1999), which in this instances were not appreciated due to lack

of variety; coersive and even “hostile” working environment; and multi-stakholder dynamics whose issues were never surfaced appropriately. Most of these being soft systems aspects, and despite efforts to instill elements of this nature, the “self-induced” pressured working environment of public sector officials dismiss these attempts citing: no time, too many meetings; over committed schedules; which serves to co-create their pressured work environment, hence the view of self-induced pressure. Leadership at any level require very simple and co-ordinated planning to provide time and energy to attend to core functions and duties, yet these fundamentals are pervasively absent.

5.2.3.10 Restructuring & Human Capital Management programme (HCM programme)

The HCM intervention was designed to asist the National Department of Justice and Constitutional Development (DOJ & CD) in terms of restructuring the organisation, whilst having a key focus upon human capital (employee skills and development). The challenge in this context relates to the case-loads and case back-logs of various courts, as well as improving the overall efficiency of the departmental throughput. The case and prosecution backlogs remain severe and often result in abuse of the overall system, appearing in the media as a national focal point. The essence of the intervention was to streamline the structures of the department, as well as introduce new and enhanced processes for both

managing Human Capital, and the enhancement of the department's mandated service delivery aspects. A key feature to this project was the fact that we had the most senior project sponsor, the Director General (Mr. M. Simelane), as well as the Chief financial Officer (Ms. S. Gomm), who both alternately acted in the vacant post "corporate services" since it was to be occupied only after project initiation. The expected project outcomes seemed extremely challenging as it represents a vital national service that has been noted locally and internationally to suffer from many flaws and challenges (e.g. case-loads; loss of key documentation; poor prosecution and conviction rates; minimal standards and consistency). The project was seen as a multi-year project due to the complexity and size of the department.

The headcount of staff was a vital challenge in that different data sources, revealed different staff numbers, with the extent of the differences ranging in thousands of positions or posts.

Application and review

Integration and implicit assumptions regarding internal capacity, performance and dedicated client team members that participated in this project reflected the same patterns experienced in the public sector in general. In this instance again, the intent of the leadership and political will for general improvement regarding service delivery was firmly present. However the internal capacities and promised support was severely

lacking, resulting in postponement of meetings, ill-preparation from client team members and a distinct lack of urgency in both dispostion toward the intervention as well as commitment from the dedicated officials forming part of the project team. The prototype planning noted client particpation, action and engagement in the intervention as crucial, and despite ensuring and higlighting these contractually, proved challenging. As an example, the highest level of authority (Director General) was the project sponsor, which bodes well for the nature and profile of the intervention since it underline it's importance and urgency. However, acknowledging the size of the portfolio and the importance of the departmental mandate, as well as the political change afoot at the time (new President and Cabinet), suggested that daily interaction and regular feedback would be a great challenge with such a senior project sponsor.

Furthermore, the high profile legal proceedings involving senior political figures at the time, implied that the ideal project sponsor should be an official having more time and focus for the intervention, and not be distracted by high-level socio-political issues. The journey map for the intervention relied upon direct access and participation from the senior departmental officials, since the restructuring outputs affected them and their staff directly, which relate to the project reliance upon their input and leadership, to aide the intervention in terms of the right message being sent and heard (Morris, 1982). Ensuring support and participation on human capital projects from within the client environment are vital since restructuring and change touch agents on a very personal level, for

example vacant posts being seen as promotion opportunities; whilst lateral staff movements to other business units we seen as a threat. Added to the personal factor are other issues like: multiple viewpoints; constrained resources; inadequate skills; and work backlogs that precipitate service delivery challenges and propel the problem toward being wicked in nature (Rittel, 1998; Rittel and Weber, 1984), and adds to the need to be careful with the use of words and vocabulary (Brutton-Simmonds, 1992). Language being important as it informs, influences and ensure support for the proposed changes internally in a much more clear and coherent manner, encouraging particpation whilst producing a form of learning-by-doing, which Yang and Borland (1991) cite as playing a role in the evolution of the ability to have greater specialisation.

Importantly, like the N2 project and other public sector experience, we proposed and incorporated an “adhoc” project team component, under the programme structure, aimed directly at alleviating immediate internal constraints, and to provide support to core functions having severe throughput challenges (such as the court-case backlogs and grievance backlogs). Initially, this aspect to the intervention was extremely well received and understood, and was incorporated under the project, including a mandate to attend to three key burning issues within the department (HR support; Data gathering and Data mining so as to obtain clarity regarding information that was highly flawed, unreliable and inaccurate). The prototype planning, and actual project realities suggested

a dedicated project sponsor, after frequent cancellation of project steering meetings, which consequentially affect approvals to proceed with work packages that needed to be signed off by the client, like for example, the re-alignment of the structures of the department.

Almost 6 months into the 1st phase or year one of the intervention, a dedicated project sponsor was eventually appointed (Deputy Director General of Corporate Service). The delay of 6 months presented a loss of valuable time since not only did the project loose time prior to the new project sponsor appointment, but the team naturally had to review all aspects with the newly appointed official, so as to ensure both our plans and the work executed leading to his appointment was crystallised and explained to the new project sponsor. This effectively implied having to re-educate and explicate the thinking, decisions and actions taken to date to the newly appointed agent, whose background was neither Human Resources, nor Legal or Process oriented, requiring additional time to "educate" and build sufficient project variety into his understanding before we could proceed. As with many instances where intervention sponsors are changed or displaced with someone which had not been part of the project before, it almost always result in the new leadership making changes based upon their perspective and thinking. In this instance, our team members were requested to halt with the provision of the adhoc support work-stream, since the new project sponsor, believed that internal

staff or officials should be doing their own work, and in fact needed to work harder, as opposed to rely upon our temporary support.

Whilst this view may be correct, this form of leadership, again makes the fatalistic implicit assumption that internal capacities exists, and indeed are capable of delivering the outcomes expected and desired from these functions and agents, which appear to "feed" the co-creation of sets-of-problems (Ackoff, 1974; Conklin, 2005). Coupled with the lack of variety and capacity of agents, within the client domain increased project delays, generating risk and refocusing of vital project team activities. The lack of structural and procedural variety of the client operations presented additional challenges, like for example: the fragmented organisational structures had no symmetry regarding complimentarity; the resource allocation to these structures had no logic, and had been based upon historical movements of positions, posts and people; the organisation contained much structural duplication by virtue of being extremely disparate, operating as stand alone business units; little to no regard to any form of integration. Many functional duplications were highlighted, for example, two policy business units; two strategy and planning business units, which were targetted for immediate improvement. The low procedural variety presented other challenges, requiring as an example, that the Minister's office sign-off on HR-related matters, such as disciplinary action, which could be dealt with through various alternate means at much lower levels of the organisation. Not only did such procedures undermine efficiencies, it caused large grievance backlogs

internally, with simple cases remaining unresolved for years. The prototype assessment and planning suggested focus upon key and immediate problem issues, such as the Grievance backlogs; the attainment of reliable HR headcount; Qualification and Performance benchmarks; as well as Structural and Procedural improvements.

The proposed structural integration and synthesised improvements tabled, were modified, and "diluted" by senior officials with their sole views of re-structuring, displacing key aspects of the plans tabled. This was another example where officials use their structural seniority, to over-ride planning based upon collective engagement and approval from affected staff, blinded by their own skilled incompetence (Argyris, 1992), and domatic, mechanically oriented command and control notions of leadership and Habitus (Bourdieu, 1995). Combined it surfaces the phenomena of interconnectedness between action and leadership that actually generate the problem (Flood and Jackson, 1999a; Churchman, 1971). As an outsider and observer, the dilution of core recommendations seem to be based upon the perception of threatening and diminishing the status of some officials; whilst others took the restructuring opportunity to enlarge their respective functional areas. Such internal dynamics are not unusual, however the structural problems were exaccerbated by only adopting aspects that suited certain officials, which diminished the opportunity to create greater structural parity and consistency. The procedural variety promoted was similarly weakened by internal forces and groupings that

sought to retain processes which allowed abusive lattitude, disguised under maintenance of standards that were dated, vague and subjective. Typically the selection, qualification, position, and performance of officials suffered from vast deviations, and was raised by many officials interviewed, as well as those participating as part of the intervention team. Additionally many previous attempts at re-alignment had failed, which made officials weary of the current attempt. The lower level officials tend to make light of the issues during interviews and work sessions, but the undertones of subjugation are very real and tangible, invoking the "disconnections" of various kinds between those deemed to have more "capital" than others, in this instance between "managers" and "workers" (Bourdieu, 1999). It also touch upon insights by Emirbayer & Williams (2005), explicating the inequalities of social settings, and the fact that SA managers do not posses sufficient transformational and change capacities (Randall, 1993). The prototype surfaced common trends in the public sector, more specifically, underestimating the importance of clear communication regarding both project-based officials, as well as the broader stakeholder (agents not directly involved in the project). The communication and change management elements, although highlighted as core to succesful project outcomes, are largely ignored, resulting in undermining project traction and the attainment of key milestones. It reaffirms the problem of implicit capacity assumptions; lack of structural and procedural variety; integration within and between sub-systems; and the highly mechanistic perspective of problem statements. Although the

project was handed over and signed off, the investment of the intervention was not realised in full, and with the lack of participation by officials, would unlikely result in the aimed for lasting improvements.

5.2.3.11 Summary of research cycle 3

The experiences above, indicate the underlying and consistent challenges in the SA public sector, ranging from: The “skilled incompetence”; Lack of all three variety type measures; Resistance to Change; Superficial investment into communication and change management; The importance of knowledge management and vitality of human capital in context of social systems. It lays bare the dominance of structure-based command and control leadership; Excessively weak governance; Limited to no understanding of systemic phenomenon and extended value chain (EVC) impacts across National interventions, all of which culminate in consistently poor service delivery in general. Attempting to introduce innovations are extremely difficult in such coersive contexts, and when creativity and innovations are introduced, these rapidly dissipate to levels of complacency post interventions since the pervasive lack of variety (structural, procedural and substantive), inherently prevents the absorption of lessons and learning.

After the three cycles of research the consistency regarding the above statements were self-evident. The Habitus of agents and agencies are deeply rooted, making strong and consistent emancipatory efforts crucial.

Added to this, the ability, tools and insights from the broader body of systems theory are extremely useful, relevant, and have underscored the need to provide systems understanding to contexts, if institutional efficiencies demanded by citizens are to be realised. From a prototype performance view, the interventions were aided by: enrichment of planning and problem statements; Delivery and implementation challenges can be pro-actively managed, which all bodes well for the need of practical integrative systems tools. However, language and communication of constructs that are hardly accessed by laypersons are exceedingly difficult to impart, suggesting that training and development of systems theory into formal educational processes may be vital. This practice support the difficulty in providing systems tools and constructs into contexts where understanding is low; where complacency dominates; where structural hierarchies are abused; where governance are flouted; where mental enslavement (Habitus) are rife; and where change, leadership and management in general are thought of as artefacts that belong to a certain class and position; where learning is deemed to stop when obtaining formal qualifications. As researcher and designer, the notion of emancipation remain a priority, but when faced with wicked-messy-type problem contexts, the erosion of such a perspective tend to fade, and may indeed turn into frustration and despair. Perhaps my idealism and theoretical bias to use systems theory as foundations to resolve socio-economic challenges does not contain sufficient “doxa” and should be tempered with appreciating the weight of Habitus in the real world.

5.3 Themes and patterns uncovered across the "2-worlds"

Themes and patterns from the "worlds of the client and designer":

The common themes and patterns recovered from the project implementations and interventions include the following:

Improvements regarding integrated insights – the enhanced understanding of the potential intervention's impact across client's "system-n-focus" when planned in context of the prototype's architectural notions proved substantial. The two most obvious sub-system shortcomings identified early were - the strategic architecture, which tended to flush out how and where the proposed intervention actually supports the organisational strategic objectives, whilst the tendency of client agents to view the strategic objectives of the organisation as discrete from operations and projects. The inability to link long-term ideas and plans, to immediate steps and actions proved substantial, underpinned by client agents belief that strategic objectives imply some future state that will be arrived at through means other than tangible incremental steps and interventions in the present. By linking intervention outcomes to organisational objectives, duties and activities, provide project participants with learning and appreciation that daily tasks in fact leads to the attainment of visionary organisational qualities, skills and capacity. The tactical architecture sub-system ensures the intimately dynamic relationships of process, people and technology to be fully appreciated, noted and planned for. In practice, despite client agent's notional

appreciation for integration, they remain locked into mechanical, linear thinking and seem to see it as a theoretical aspect, something that is ephemeral, as opposed to being practical. The continued separation and distinct dominance of one or more of the sub-systems (e.g. leaning either toward people, or technology sub-systems) are seen to stem from structural orientations and the leadership and management orientation of agents (e.g. if the chief technology officer have a stronger influence than say the HR officer, then technology would be relied upon or focused upon more intently).

The difficulty in practice is that often the intervention mandate is very specific and narrow, which limits and sometimes disallow assistance in this regard, thus whilst the intervention and problem statement may be enriched in terms of linking sub-systems, it may be interpreted as "straying" into areas that are closed-off or beyond the actual terms of reference of the intervention. The figure below summarises this pattern, whereby poor planning and implementation are enriched, providing expected and unexpected outcomes.

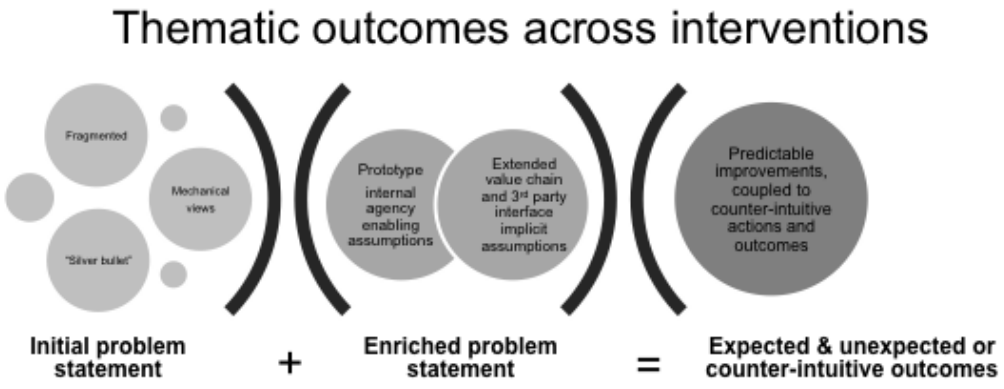


Figure 5.12: Thematic patterns regarding intervention problem improvement and outcomes of interventions.

In such instances, it remained the obligation of the project team, to advise and report upon the potential integration challenges (e.g. N2; DoJ & CD; DoSD). The issue in this regard extend beyond client-based preference of one sub-system over another, but are exacerbated by software vendors in terms of how they sell and position products, having little consideration of other equally important sub-systems (process and people). Similarly, within the firm integration between accounting and invoicing of clients, were inadequate, creating cash flow timing problems and additional accounting costs. The back office support despite being a small team, also suffered from domain clashes whereby strict interpretation of their functions and tasks could not be reconciled in terms of sharing key information between each other, exacerbating overdue invoices, accounting errors, and taxation penalties.

Improved planning dimensions – was a sound improvement, touching upon planning insights gained from systemic potentialities and considerations (implicit assumption across both the internal capacities, and extended value chain). The practice reveals a distinct lack of public sector planning to appreciate the dynamics of their own machinations, more especially governance and procedural requirements. In other words, public sector agents know full well the nature and extent of their procedures and requirements, yet hardly infuse these into their plans, thus the nature of their planning, seem to exclude known internal operational impediments. Despite having the capacity to develop strategy and other forms of

planning, the plans in themselves are highly optimistic and seem to assume that agents are most dutiful and diligent (e.g. N2 whereby continuous caution raised but ignored; Similar to DoJ & CD's continuous requests for a permanent project sponsor). The planning for the firm's business development or sales were also enriched whereby limited resources were used more effectively, by understanding both the client environment and the firm's operational constraints. The value translated into sales planning to factor in the posturing and promises made by both client and firm partners in terms of timelines and the required upfront investment needed in the pursuit of the revenue. As an example, almost all opportunities tabled by the firm's sales team, contained no consideration of lengthy client procurement processes, yielding an opportunity pipeline being highly optimistic, laden with third-party promises of performance borne from lack of insight regarding planning within their own and client domains. This can prove risky if unchecked, meaning that business development team members tend to trust what is being told to them as being absolute and precise, and do not recalibrate their sales pipeline expectations with known facts, practices and context, and as such internal managers tend to "table-a-fable", i.e. their sales forecasts become overly optimistic. This is especially evident in large potential contracts where claims are made that it would be translated into a sale in a short time period, when practical experience and understanding of client planning parameters clearly shows otherwise. In practice, systemic planning considerations articulated, are seldom implemented for various reasons

(time or cost preventing potential improvements from being realised), leading to other operational challenges, like budgeting in the public sector whereby sufficient funds are set aside for key annual outputs and objectives, but are not delivered upon due to bad budget planning.

Prototype planning has in all instances provided planning integration insights, revealing oversights, weaknesses and assumptions resident in standard planning. The value of improved planning promotes integrated and specific linkages of intervention outcomes to elements that had not been considered before (e.g. internal agency weaknesses directly affecting intervention outcomes), which clarifies the multitude of relationships and potential bottleneck usually ignored, making the planning more purposeful and practical (e.g. Vulindlela's training of 15000 agents and introducing standards for budgeting; Whilst the OAG planning revealed important factors that were not considered, such as the high cost of technology, and the transversal scale of the intervention's transformation).

Improved problem statements – another positive result from prototype planning relate to the consequential improvement in the robustness of the problem statements generated when having the rich picture contexts. The Vulindlela project highlighted elements not considered before (e.g. the large user community input and needs were ignored; Design flaws). The value however of a more robust problem statement, appear to have a few practical consequences. The one relates to where clients, often

erroneously interpret the wider and deeper context as vendors possibly wanting to extract more revenue, than what was planned and committed for in the original appointment or terms of reference of the intervention. The other common thread is where clients request the vendor or service provider to include additional work, under the original terms of reference, with no reciprocal additions to the cost model. A third variation is where despite having robust plans and implementation detail, client agents tend to "sign-off" a variation or "watered-down" version of the proposed intervention approach. These practicalities can be easily overcome within transparent, sound governance and contractual additions and agreements, and may simply require parties to negotiate appropriately, however notions of skilled incompetence; Habitus; Leadership style; Lack of variety; Inability to address messy situations (crossing internal or external boundaries), prevent full adoption of robust solutions. In practice, it tends to impact project funding or budget, when compared to budgets set-aside for the original terms of reference, creating frustration to both client and vendor (e.g. reducing the scope of work; excluding important elements; squeezing efficiencies from the implementation team). All of these may be sound actions, however the nature of the increase or decrease in budget or scope does not have a linear relationship to integrated planning and implementation, which is a difficult issue to explain to clients that demand results to match or exceed intervention budget. Variations of this feature can be seen across the public sector, where tenders are awarded to the lowest bidder, who eventually cannot deliver the desired outcomes; where

large amounts of resources are invested into strategic planning sessions, but are hardly infused into operations; where officials spend great amounts of time abroad but seldom bring back the lessons and application innovation to their departments.

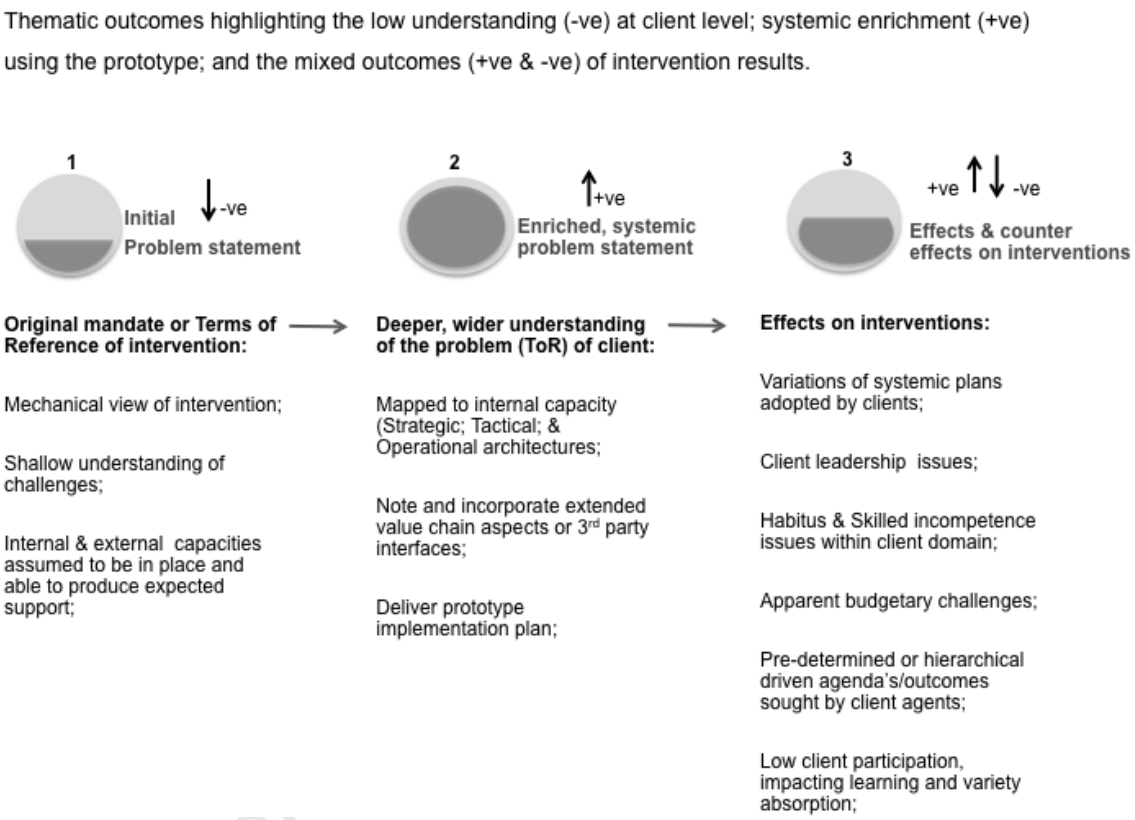


Figure 5.13: Thematic outcomes whereby robust problems are diluted in practice

Figure 5.13 above depict the theme whereby shallow understanding are enriched, yet are often diminished for various reasons as noted. The capacity to see deeper and wider assisted the firm regarding issues such as revenue creation (sales), and overhead management (back-office support & administration), whereby the operational managers responsible for these two business units tend to only see their own immediate concerns

and requirements, and presented itself as an opportunity to explicate the need to see how both functions and activities are essential and complimentary, as opposed to engage in a “battle” for superiority and importance. The difficulty in practice is that often, the managers responsible for complimentary functions, are unable to appreciate the need to have variety, and tend to feel threatened when having to create a wider and deeper understanding. The variety needed to overcome such hurdles, when both introduced and explicated, are diminished considerably by managers feeling compelled to have control and domination of their respective functions, thereby seeing integration and systemic problem perspectives as threatening, as opposed to a valuable insight. The other issue relates to notions of hierarchy regarding structures, such as for example between the conflict of project based staff and administrative staff, whereby notions of superiority come to the fore due to their inability to see that the problems they need to resolve touch upon both areas (e.g. time sheets of project staff must be handed in to admin staff, in order to invoice the clients). Similarly, structural superiority between managers of finance and back office support divisions also resulted in a similar disposition whereby enriched problem statements are seen as the “fault” of others, which excluded their own functional areas. Improved problem statement benefits remain clear, and could open new avenues whereby expert agents or agencies specialise in developing robust problem statements for organisations.

Predictive alerts – an important feature gleaned from practice relates to benefits from higher integration, improved planning, and robust problem statements. By engaging in, and developing improved systemic operational insights of the client domain seem to allow for small-scale predictive alerts, by virtue of improved understanding of interventions, in context of the client domain (client's architectural considerations; and external EVC considerations). It reveals potential bottlenecks and related constraints likely to impact the intervention and cultivate the ability to recognise and appreciate potential or impending challenges that arise from the interconnectedness of sub-systems, with practice examples being diverse (e.g. funding challenges and 3rd party interfaces on the N2 project; DoJ & CD's lack of dedicated client support staff; OAG focus upon a "perfect policy" as opposed to "learn-by-doing").

The increasing capacity to appreciate interconnected sub-systems in context of the system-in-focus provided gains to the firm, whereby the opportunity pipeline generated by the sales team included mostly high value projects, with little to no consideration for the competitive landscape (other firms), and little infusion of client domain constraints, such as tedious procurement cycles. These insights revealed the potential revenue targets contained in the pipeline generated by the sales team, as being overly ambitious and over-reaching. The firm's sales team also tended to remain steadfast upon relying on 3rd party information, and neglecting known public sector procurement timing issues. As designer and

participant, anticipating this behaviour and disposition allowed for part mitigation of these risks by further “filtration” of potential opportunities, and having a refined set of revenue plans, so as to ensure more realistic sales targets.

Importantly, prototype planning reinforced the practical and ever present competition for resources, and in context of the firm as a viable organisation. It appears that certain sub-systems may be more important than others, based upon immediate circumstances, e.g. 2 core needs for the firm related to Sales, the other Research and Development, both sub-systems being vital for a viable organisation, yet, at start-up phase, the need to close a sale was deemed more important than R&D, since a successful sale would create revenue to continue with the R&D. This dichotomy hold a few implications, one being, the focus upon one sub-system at a particular point in time, over another may be precipitated by environmental factors, like say obtaining a sale first, to create revenue for needed on-going research. The practice thus suggest that depending upon the immediate situation, the choice of attention to one or more sub-systems, overriding the importance of other sub-systems are to be constantly reviewed against the landscape within which the organisation operates, as it may directly impact and focus upon one or more sub-systems. A secondary implication, is to note that the focus upon key sub-systems may fluctuate, meaning that resource constraints in context of the environment seem to determine which sub-systems enjoy more attention at

a specific time. Using the above example of the sale sub-system, and the research and development sub-system, the sales may be focused upon intently, however, once sufficient revenue is created, the research and development sub-system can replace it as the core sub-system focus, which introduces the fluctuation mentioned above. This entrepreneurial shifting of sub-system focus is quite removed from the equilibrium-based planning envisaged in most theoretical models. The lesson suggest constant reflection in asking a key question of "what is important right now for organisational viability?" promoting deeper insight as to immediate requirements, sharpening focus as to which sub-systems are to enjoy more focus than another at specific periods. If such reflection is done regularly, it surfaces subtle fluctuations in focus of the various core sub-systems (e.g., recruiting expensive resources can only become the focus, once sufficient cash flow allows for it since if they are recruited too early, it may threaten viability, despite their importance in the overall context).

The local thematic aspects prevalent, considering the above predictive capacities proved useful and valuable, more so when "anticipating" client responses to ideas, innovations, creative solutions, which can be used to support interventions by finding "smarter" ways of introducing these with the support of the client. The figure below depicts this potential whereby considering the: Habitus of agents and agencies; Low levels of variety; Reactions to robust problem statements; Fluid, messy or wicked nature of

problems; can prepare “would-be-improvers” with advanced or predictive capacities and thus plan for it.

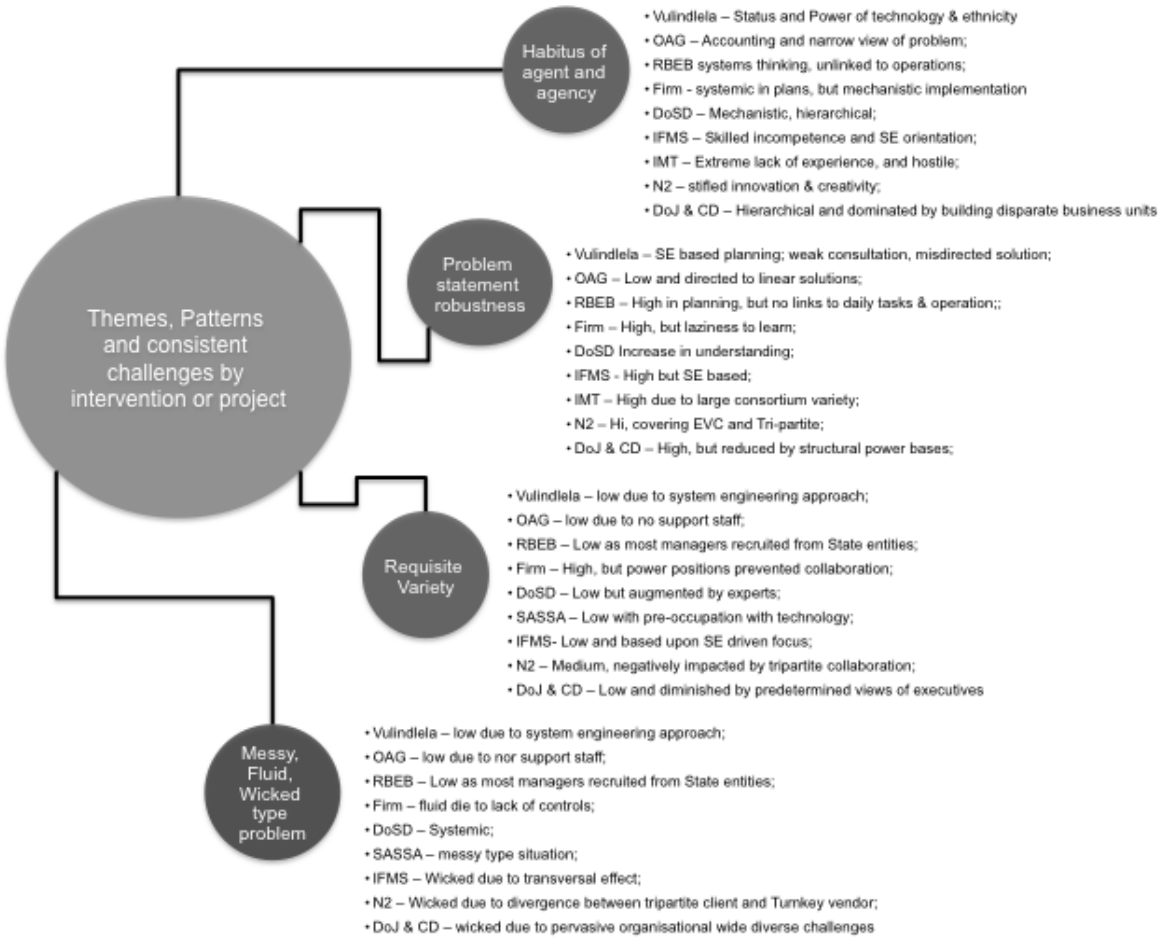


Figure 5.14: The interlocked dynamic themes that may provide predictive aid

The prototype does not provide definitive answers, but assist in creating deeper understanding of the choices to be made, and the potential consequences attached to these. As an example, the notion of integration when applied in context of an intervention requires structural, procedural, and substantial variety across the organisation. In contrast to a start-up or entrepreneurial organisation, the rapid environmental changes and its

context have a different impact, whereby integration is applied in context of immediate survival, as opposed to an ideal based upon the assumption of having access to resources. A perfectly resourced organisation, it would appear is therefore quite theoretical, and that resource constraints and environmental conditions tend to have a major impact upon both the focus and arrangement of sub-systems. This is an interesting outcome since mostly it is believed that the public sector or government have access to infinite resources, when in fact they too are faced with the same resource and landscape dynamicism.

When looking at the internal operations if the firm, the propensity to make implicit assumptions are not unique to the client environment. As a start-up business, it is important to use scarce resources as efficiently as possible, and despite integrated planning insights, the implementation thereof may also suffer due to resource limitations, e.g. multiple tasks undertaken; and integrated planning, being implemented by making “certain sacrifices and the cutting of corners” which, when compared to the public sector, is much easier to effect due to the limited oversight bodies and mechanisms. This have interesting implications when viewed against the international landscape where large multinational private sector firms are increasingly under the spotlight due to negligences and related abuses, and when compared to governmental abuses would highlight no real difference between the actions of agents charged to manage these agencies. In summary, the diagram below, captures the fuidity of real-world dynamics,

that include value add, learning, and theoretical confirmations related to this journey. Importantly it makes clear the mobility of problems or the wicked, messy nature of real world social systems, which in this instance, started with the system theory characteristics of the local context, proceeding to the emancipative aspects targetted, by keeping in mind the local constraints. These efforts in turn produce both expected, and unexpected or counter-intuitive results (the dilution of robust planning; Over-estimating internal capacity; "Laziness" to learn; Underestimating the importance of "learning-by-doing"), which in turn both contribute and result in, problems being "mobile" in nature, "messy", or even "wicked".

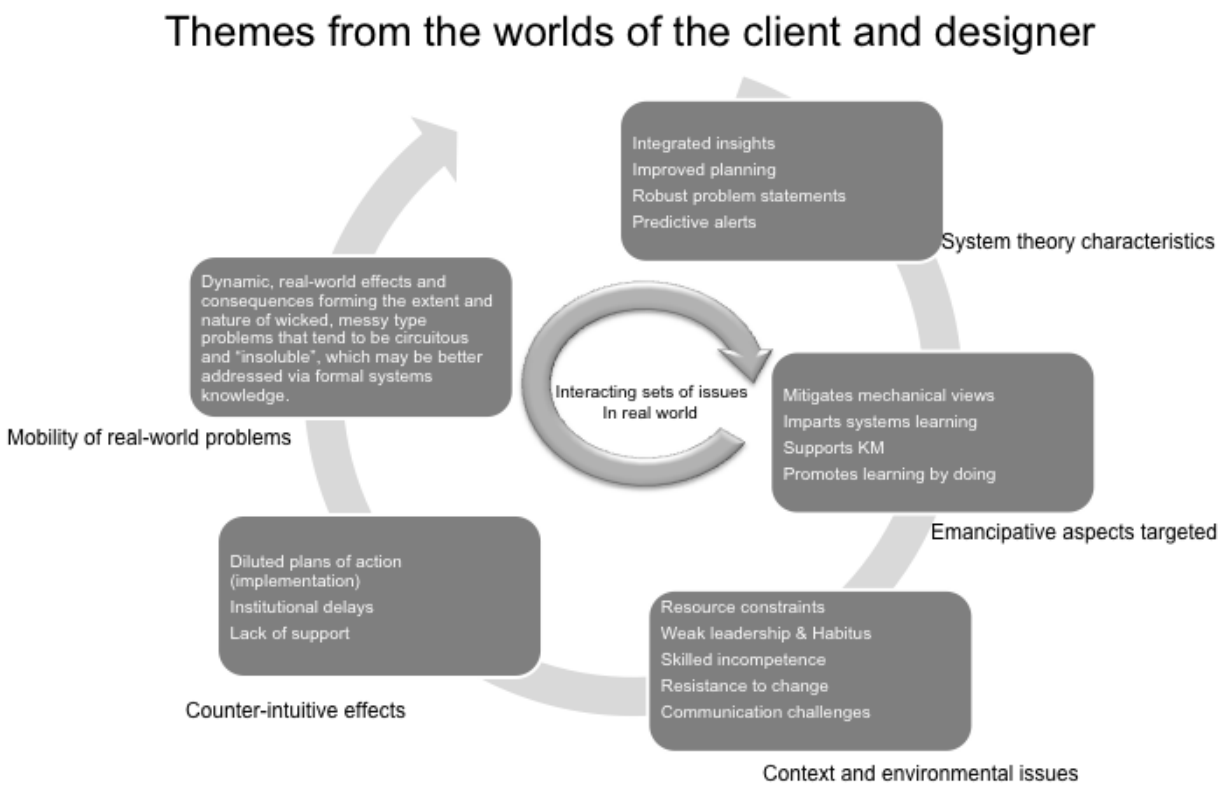


Figure 5.15:The fluid or mobile nature of interventions in the real world as experienced in this journey

The circuitous nature of theoretical models and the real world have an interplay that defies absolute control and have been identified in literature in a number of ways (e.g. diffiiculty of unbiased or closed observertions; emergent phenomenon; dynamicism of complex systems; perturbation and transient lengths regarding system dynamics). It seems that effects of improvemens often produce results that are unexpected or unwanted, which may only be better understood by appreciating and continuing to improve our understanding of the interconnectedness of systems and sub-systems, that we engage constantly in the real world, hence the fuild nature of problems and solutions.

CHAPTER 6: ASSESSMENT OF THE WORK AND PROTOTYPE

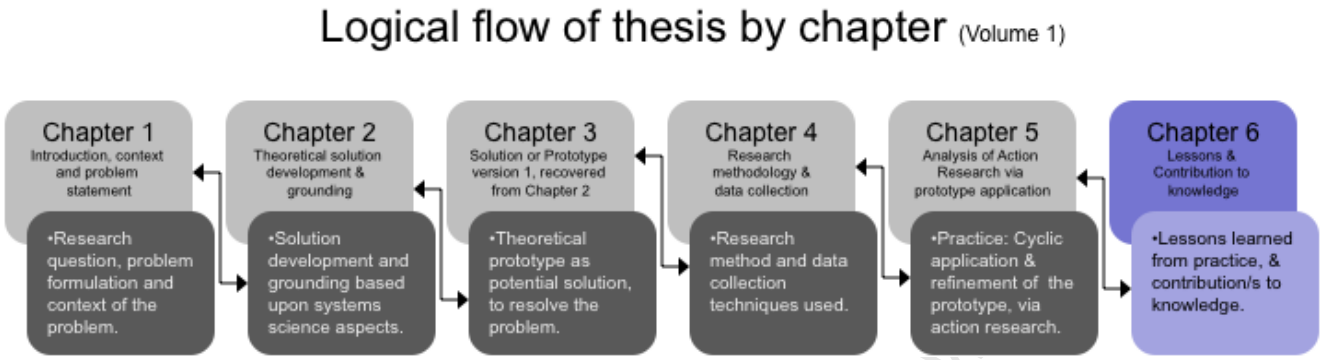


Figure A.6: Repeat of figure A, highlighting chapter specific focus and content

This chapter takes a critical look at the practical contributions, new knowledge, insights and how the prototype performed regarding integration aspects. It relates the potential value the prototoype provide in terms of the general debate regarding systems theory, organisational development and social systems. It introduced varying degrees of gains across the key areas as set out in Chapter 1: improved problem statement definition; improved strategic capacity; improved integration; adaptive programming.

6.1 Value add and practicality of the prototype

Aiding agents and agencies with improved business integration, and system-centric rapid delivery models, presents itself as a very important and necessary value proposition in the context of innovation, creativity, optimal resource allocation and efficiency across all social systems, which are pronounced when considering the notion of Habitus (Bourdieu, 1991, 1975) touching upon all individuals and societies to varying degrees. This is similar to Berstein's "Code" (Harker and May, 1993) whereby subjugation and rigidities of social "rules and norms" undermine emancipatory efforts. Futhermore the implicit assumption we make regarding agent and agency behaviour across extended value chains, support the need to have tools, methods and techniques to equip agents and agencies in order to develop improved escape trajectories. The implicit assumptions made by agencies and agents alike regarding governance, performance and quality metrics, along the long route of accountability (Keefer and Khemani, 2005), must be supported, if improved developmental outcomes are to be attained. Practical aids to assist in problem solving, communication, change management, and thus inovation and creativity, are aspects missing in the local context (Boyatzis, Cowen and Kolb, 1995; Bagayoko, Kelly and Hassan, 2000), implying a lack of higher-order thinking, that are needed to ensure agents and agencies are open to multiple interpretations, and the capacity to deal with uncertainty (Kirkwood, 2000).

To support this broad and diverse requirements, systems science as a growing body of knowledge has been shown to add value (Jackson and Keys, 1994; Casti, 1994; Ackoff, 1999), and therefore key in deriving the prototype, to provide tangible, practical support for the following areas:

Problem statement improvements represent meaningful gains to any intervention planning, and provide practical support to all the projects undertaken as shown. The fact that improved or robust problem statements tend to be displaced in the local practice are based upon various reasons such as: delivery pressures; interpreted as “scope creep”; inter-agency boundary and demarcation issues specific to the intervention mandate; competitive tensions within and between business units; Leadership challenges; Reluctance to change; Lack of variety; Language; and communication challenges (Bagayoko, Kelly and Hassan, 2000; Van der Vyfer, 1991; Holmes, 2006). These difficulties tend to support the research of the “messy and wicked” nature of social problems, whereby multiple forces act upon all forms of planning and implementation. However as a practical tool, the delivery of robust problem statements are vital since it educates, informs, and prompts agents and agencies to think deeper and wider.

Improved strategic capacity is also made clear by linking intervention outcomes directly to agency objectives, explicating the need for change in a manner that is inclusive as opposed to authoritative.

The mechanical management view is pervasively ingrained through Habitus, whereby hierarchical and structural control are commanded, perpetuating the low orientation to innovate and be creative, by virtue of diminished Variety (structural, procedural and substantial variety – Gazendam, 1993). This makes the notion of improved strategic capacity important at all levels of organisation since it leads managers to appreciate that strategy is not the preserve of senior staff, nor a grouping of people in a division, but requires invocation of learning, change and leadership skills at all levels, thereby reducing bias of management (Brookfield, 1987; Thomson, 2003).

Integration was the most obvious and tangible improvements at project level, it's richness covering both internal boundaries, as well as third-party interfaces, external to the intervention boundaries. The continued practice and search of integrative elements allowed for deeper understanding of extended value chains and the implicit assumptions agents and agencies make on behalf of each other, revealed in forms such as "skilled incompetence"; "hierarchical abuse" (OAG; IFMS; DoJ&CD projects). The wicked nature of systems was also shown to impact integration gains in practice, with "losses" stemming from "inter-agency competitive tensions"; "accountability and governance boundaries"; "communication and change management" aspects as experienced across interventions. With improved leadership skills; stronger team-orientation; systemic perspectives; and the

encouragement of innovation and creativity, such practical challenges are not insurmountable.

The **adaptive programming** benefits were also evident whereby pro-active or anticipated resource constraints and value chain impediments were used to amend plans and actions. The “predictive” or early warning of potential issues on a number of projects allowed for anticipation and remedial planning. This gain relates to building a sense of systemic potentialities so that planning can remain flexible by way of monitoring and evaluation (feedback loops) of key areas and intervention parameters, like for example: OAG’s focus upon accocunting resources; Vulindlela’s techno-centricity; N2’s Funding collapse; DoJ&CD client sponsorship. This flexibility value provided for tangible integrated service delivery improvements, however a challenge in this regard relate to clients and intervention sponsors not acting upon, nor readily observing and anticipating what flexible planning promotes. Systemic language it seems cannot be made easier or more accessible to lay-persons, which the prototype tried by virtue of using conventional terms and language. Tied to these observation underly the difficulty in “making” agents and agencies see systemicity and the implications it holds for planning and implementation. When such integrative and robust planning elements are not appropriately actioned, it tends to dull emancipative efforts of agents and agencies.

Considering the above, the prototype present utility regarding notions of

quality; governance; improved targeted social interventions; and overall developmental planning (e.g., promoting SMME's; job creation; policy effects across agent and agency behaviour).

Research insight relating to the notion of contractual lock-in and long term corporate protectionist strategies highlighted by the work of Williamson, (2005), may in fact be better understood in such a dynamic context whereby agent and agency dispositions are implicitly assumed to be competitive and healthy. The prototype provide support by better understanding the unique configurations of agencies, and how their unique configurations (strategic, tactical and operational dynamics) evolve, change and are modified in terms of responding to market dynamics.

The idea of having some form of encompassing systems toolkit or framework that is at once practical, as well as informative, is a vital need in practice. Although the prototype may be far from such a possibility, both experience and research suggest that practicing systems experts, as well as the researcher community, may find it useful to collaborate and combine efforts in delivering such a practical compendium of system tools, to serve the diverse communities of users, practitioners, managers and researchers. The varied and ever growing bodies of knowledge, as well as the proliferation of products and technology supporting these developments, seem to support such an ambitious concept. Thus a collective effort may ensure greater consistency, harmony and integration of systems theories and tools in themselves, as opposed to compete for

space, or become subjugated by inferior products and tools based upon strong marketing and positioning, rather than being embedded upon sound theoretical platforms and recorded practice.

Many notable researchers and scientists promote system-like views when discussing social systems (de Rosnay, 1979, 2000; Stock, 1993; Russell, 1995; Chen & Gaines, 1997; Miller, 1978), with some studies using the CAS approach covering biological systems, immune system, nervous system, origin of life (Autopioesis from Maturana and Varela, 1980, 1992; Holland, 1996; 1992); or ancient civilisations, stock markets, economies (Anderson, Arrow, & Pines, 1988); whilst some cover perceptual control theory (Powers, 1973, 1989), and metasystems (Turchin, 1977) transitions. These scientific approaches, all have a common thread relating to the systemic nature of social systems. An important aspect of the protoype was to seek out the practical possibility of absorbing global systems constructs, models, and tools, into a unified framework that evolves in keeping with new insights, discoveries and techniques. The outcome suggest that the current version of the prototype, although more systematic as dominated by hard-system content of it's sub-system architectures, provide support for this argument, whilst admitting the extreme difficulty in synthesising plural approaches, in pursuance of such an ambitious target. Despite such setbacks, this body of work reinforces the importance of: a practical sense of integration; the vitality of theoretical and practical linkages; the proposition of potential systemic absorption as ongoing

research and application efforts (e.g. displacing current strategic architecture content, with more relevant systemic planning like that of Ackoff's pre-emptive planning).

Importantly, it supports the combinatorial potential of hard and soft systems, as a necessary aspect of our increasing knowledge, and a basis for improvement in the content and evolution of the model concept. The implementation experiences and practical benefits that appear to arise when using the prototype relates to some of the following:

- Have the potential to become increasingly robust as it increases the absorption of key system constructs;
- Transferable, in terms of applicability to various scales of interventions (large and small businesses, programmes and projects);
- A beneficial guide that support the construction of integrated patterns before undertaking action;
- Capable of generating improved problem definitions and solutions, to address problems in context of their unique conditions and the arrangement of their sub-system architecture. This is much like a "golden thread" that ties and integrates prototype sub-systems, creating the uniqueness of an agency, and may therefore be able to aid in mitigating the blind adoption of previously successful solutions, in new problem contexts;
- Improve insights regarding notions of absolute control, indeterminacy, emergence, causality and dynamicism regarding social systems, in a

practical manner, supporting the migration from mechanical to systemic thinking;

6.2 Summary of the credibility and significance of the work

The practical gains are significant regarding conclusions pertaining to the broad body of systems knowledge, and specifically where the prototype presented beneficial qualilties, in that:

(i) it provides a systems-based platform for discussing an intervention (project) critically and constructively;

(ii) it assists to integrate the various crucial issues, using systems concepts in terms of simpler vocabulary, thereby practically facilitating integration, communication and innovation;

(iii) it presents a visual impression (map or territory) of how the various components of a system impact each other in a practical manner, providing an opportunity for some kind of support and betterment, without the mechanical preocupation of a “perfect solution” or having a “silver bullet”;

(iv) it supports the importance of creativity and innovation in management theory and practices;

(v) it provided significant assistance in terms of client challenges, whilst providing sound improvements to client systems (organisations);

From a general view, it contribute to current debates regarding the utility of multi-model approaches (soft and hard system theories), in order to build practical, robust tools that may be applied in various contexts, as supported by the various scales of interventions and their overall positive outcomes, suggesting transferability and consistency. Specifically, two key insights may prove useful for detailed further work (i) the notion of "mobile-focus" meaning the concentration upon a specific sub-system, based upon the most immediate environmental constraints or perturbations, which may "move and evolve" over time, requiring a "shifting type focus" to match the "mobility of the problem context" – i.e. the fluidity of real world challenges (messy-wicked type problems), dictates the need of a "shifting focus" in order to adapt to dynamicism of complex systems; (ii) the unique features of agencies as expressed in terms of their architectural configurations, meaning an agency's "golden thread" that make it unique. This is meant to imply the unique manners in which an agency is configured regarding its specific BAT (how the agency is structurally disposed toward strategic, tactical and operational architectures, since some agencies may be strong in planning and thinking related aspects, implying a predisposition to the strategic architecture; another may be very strong or good in its operational architecture). Drucker's view of the knowledge worker emphasises specialised skills, manipulation of symbols, ideas, and the capacity to acquire transferable knowledge having multiple utility in a given context. This is seen to link the context of the problem situation or problem type, where problems do not exists free from its context, and as such, solutions

that are offered, must be adjusted to match the context and to address resident exceptions (Gharajedaghi, 1999). Drawing upon these insights, the unique organisational features, meaning the "business-architecture" sub-system arrangements unique to each social entity, ensure that each solution contain unique features. The unique configuration of strategic, tactical, and operational architecture's could be seen to be the "golden thread" running through a specific entity's architecture. As knowledge workers, being able to relate, enhance, improve and constantly re-align the unique golden thread is seen as providing potential value in addressing uniqueness of entities and their contexts. Solution architecture's must have the capacity to see both differences and similarities, which helps to develop management and leadership capacities to solve existing problems and, how to formulate problems (Ackoff, 2001). The prototype compliments this thinking and have realised such benefits during the application experiences.

An element in the overall running of the firm was to purposefully avoid formal, rigid structure, in order to test self-regulation, i.e. notions of self-regulation and self-construction of complex systems. The purpose was to see how the firm and it's team members shape their own developmental structures, whilst operating the business, much like Quinn's, Building the bridge while walking on it (2004). Lessons in this regard suggest the need for individuals and team members to have some experience in systems thinking, as well as having a disposition toward continuous learning, or at

least the ability to absorb and institutionalise improvements. The client environment tends to reflect the same outcomes regarding the lack of institutionalising project benefits, with agents having a similar negative disposition toward continuous learning. The lack of continuous "learning" directly impacts an agent's ability to innovate, observe and reflect critically, which reduces the agents variety and adaptation. These factors may reflect the average leadership and management response of imitation, as opposed to origination (Quinn, 2004), gravitating toward a seemingly superficial state of systems adoption, unable to observe and reflect on their own actions and decisions. As an example internal to the firm, the passion and commitment of firm managers seem only to emerge on the occasion the designer/researcher visits the office, but dissipates rapidly when alone, referencing a sort of dependence or reliance to be provided "leadership", and not engaging in the act of leadership itself. Some of the key aspects that could relate to this phenomenon may include:

- Designer/researcher's inability to provide sufficient guidance on topical aspects;
- The common viewpoint that leadership is located in and reserved for various positions (organisational structures and levels of seniority), as opposed to being open to all individuals;
- The comfort of the familiar being too strong, to be overcome by change (Habitus);

- Laziness to think, since we have research, models and constructs "fed" to us, creating a convenience of "receiving gospel", as opposed to "generating gospel" – i.e. "laziness to think, innovate and create";

Another observation from the firm's management team relates to them imitating certain aspects of those that are seen as leaders and successful among the team. Again, this imitation is disappointing since these agents choose to mimic the superficial, superfluous, and materialistic aspects, as opposed to the essence of what makes the few partners (agents) successful, such as research, creativity, tireless work ethic, and a passion for learning and improvement. Another interesting reflection relates to the firm's team members shallow understanding of business relationships, whereby they often, and in some cases exclusively work via 3rd and 4th parties, in order to reach a client, highlighting two concerns: Firstly, the belief that business is exclusively attained via relationships. Secondly, agents do not possess the confidence that seeds the creation of trusted relationship building. The confidence in turn results from the personal growth and mastery obtained via self-improvement. This positive reinforcing loop encourages the subsequent breaking of self-imposed limitation or restrictions, across various areas. It has become clear that clients and firm agents (people in general), listen much more attentively, and are attracted to the performing team members because they display "passion" and "leadership" qualities (Quinn, 2004). The under-performing team members of the firm, speaks directly to their inability to develop their

own, personal escape trajectories from their Habitus (Bourdieu, 1991, 2000), despite having tools available to them.

The management experience support the research findings that change is difficult, and rarely proceeds smoothly (Dawes, 1998; Miller, 1993). Individuals have a tendency to resist change, preferring habit, which usually result in inertia, and a negative spiral (Masuch, 1985), referred to as the slow death phenomenon (Quinn, 1996). Resistance to change arises from two powerful sources such as habit, risk aversion, and the comfort of the familiar (Ellsberg, 1961), so that agent interactions can be governed by automated responses that duplicate prior behaviors (Bargh & Chartrand, 1999), particularly since agents tend to interpret new situations as variations of familiar ones (Dreyfus & Dreyfus, 1986; Wiley, 2003). The experience of running the firm, reveal the power of habit and familiarity are increased by the tendency to adjust goals to match behavior, i.e., it seem team members of the firm, prefer lowering goals or aspirations, rather than to embrace change (Cyert & March, 1963), entrenching the reluctance to try the new. Another source of resistance to change relate to the general human sense of identity and desire for control (Pittman, 1998), resulting in agent's avoiding uncertainty as the lack of predictability threatens their sense of efficacy (Depret & Fiske, 1993). Thus, when the environment demand change, we perceive it as a threat to our control, i.e., we tend to follow the path of least resistance and do what is familiar (Fritz, 1989), and in the process, cannot align ourselves with the dynamic real world,

preventing us from experiencing deep change (Quinn, 1996). This was a direct experience across interventions as well, whereby agents have a great reluctance toward innovation and creative solutions, reflecting the very real extent of such deep rooted disposition of agents.

Another lesson relate to the prototype's key message, i.e. that business, is not about trying to manage the apparent chaos, but rather being able to relate to the innate systemic qualities of connectivity and dynamicism. Deeper understanding of sub-system dynamics, such as the notion of the "golden thread" (unique configuration of sub-systems of entities), serve to build upon and create systems insights. It practically assisted in understanding and observing the notion of "mobile focus" or how focus on specific sub-systems of the system-in-focus, may indeed shift based upon most immediate internal and external perturbations.

There are seldom clear answers, but systems tools create comfort in knowing that the levers available to us, can move the system toward the overall or general outcomes we seek. Agents across both "worlds", failed to grasp this aspect, resulting in them being controlled by a chaotic environment that they themselves co-created, with additional unwillingness or fear of attempting to better understand systemic interdependencies and the counter-intuitive behaviour of social systems (Sterman, 2000). The prototype conceptually reveal the ideal enterprise to be a complex adaptive

social system (Plsek et al, 1887), that maximise stakeholder value (employees, customers, shareholders and others), comprised of an organisation (Ackoff, 1999) of people, processes and technology interacting with its transactional environment (Gharajedaghi, 1999) and adapting to rules of a schema (Holland, 1995). This is what the prototype sought to integrate in a practical manner, using its notion of organisational architecture having unique golden thread configurations.

Hackman (2005), among others call for theories that bridge the two worlds of scholarship and practice, i.e. scholarly concern of causes, with the practitioner needs of outcomes, arguing frameworks that are conceptually sound, and to guide constructive action, by generating ideas that lend themselves to empirical examination as well as practice. The prototype offer value to both scholars and practitioners, derived from the analysis and results of organisations (projects) facing dynamic challenges. The action research and development of the prototype being akin to the work of Quinn (2004), i.e., “the building of BAT, whilst implementing it”, drawing support from the practice whereby common people (clients and consultants) are forced by their extreme challenges to extend themselves in ways that they would never have predicted. As human beings, we try to reduce uncertainty to create conditions of equilibrium (Langer, 2002) and preserve our current mindset, a hedonic preoccupation, where we seek out comfortable and pleasurable experiences (Waterman, 1993), and in the process destroy personal and organisational fitness. Schon (1971) rightly suggests transformation in the way we think, whilst Ackoff (2004) pleads

for a similar transformation in helping policy and decision makers realise that development and growth are not the same thing; Growth is an increase in number; Development is an increase in competence, meaning growth is a matter of earning, and development is a matter of learning. Since development is a matter of learning, one cannot do it for another, implying the only kind of development possible is self-development. However, one can facilitate the development of another by encouraging and supporting their learning (Ackoff, 2004).

6.3 Possible contributions to advancement of knowledge

The following contributions to knowledge are offered, and though much of this body of work, are in fact not "new" discoveries since the findings, observations and reflections were later discovered to exist in literature, like for example the notion of "mobile problems" which already existed in terms of Wicked, Messy problems. Similarly the notion of "laziness to learn" in this work, can be seen to relate to both Habitus and "skilled incompetence" from Bourdieu and Argyris respectively. This however is seen as being in support of the credibility of this work, as opposed to trying to make original claims. The merits and rigour of action oriented research is clearer when one steps outside of one's own paradigm, whilst remaining sceptical about your own approach, which in itself produce rigour and relevance (Dick, 1997). The common features of agent and agency behaviour encountered across projects, being documented challenges in research literature, are offered as evidence of thematic challenges prevalent in the local context.

6.3.1 Complex problems having wickedness, messiness and "mobility"

Rittel and Webber's (1973) original work on wicked problems, notes ten characteristics, some of the more interesting ones being: defining wicked problems is itself a wicked problem; no immediate, nor ultimate solution to a wicked problem; every problem is unique; wicked problems have enumerable sets of potential solutions. Conklin (2005) in applying wicked problems to policy and planning issues notes similar characteristics, most of which has been experienced across interventions, more notably when attempting to provide solutions to clients, deeper and more systemic understanding reveals more challenges, to the extent whereby original assumptions of the interventions are questioned (e.g. OAG; N2Gateway; Firm's back office). Whilst the use of the prototype exposes the nature of the inteventions and local challenges to be systemic, these are dismissed for various reasons by agents and agencies for reasons: need to show results based upon over-committed political promises; service delivery backlogs, and the divergent opinions on how to attain either or both. Prior to researching wicked problems, the notion of "mobility" of problem statements and solutions were reflected upon due to the various project experiences. It seems that as soon as we fix certain intervention aspects, other issues are often directly uncovered, which underly the fluid or mobile dynamic. The difficulty seem to be that agents do not fully appreciate increased integration, deeper planning and pre-emptive operational awareness, despite the clear deficit regarding service delivery over the last

12 years, which is an observation that ties into, and meet some of the defining criteria offered by researchers like Ackoff, Conklin, Rittel & Weber, regarding such problems.

A recurring theme in research and systems literature is the connection between wicked problems and design problems, which have ill definition; many different perspectives; and demand creative solutions. To this end Roberts (2000) identified strategies to cope with wicked problems, like for example and **authoritative strategy** which leaves solution development in the hands of a few; **competitive strategy** which have teams weigh their solutions against each other; **Collaborative strategy** which engages all stakeholders. Each of these have their own challenges, such as authoritative strategies assume the few solution generators have sufficient variety; whilst competitive strategies may result in adversarial concerns; and collaborative strategies require a great deal of time to create shared understanding. In varying degrees, these have been experienced in this work, whereby competitive tensions in large and diverse teams require additional help (DoJ & CD; Vulindlela); Authoritative strategies, like the N2 gateway project which enjoyed Presidential sponsorship; Collaborative strategies like the RBEB and DoSD (which required much more time and patience to gain a shared mental model). It would thus appear that much of the systems tools and models available have a strong correlation to this work and experiences. It confirms the need to formally and informally impart systems tool, language and methods since the relevance and

emancipative results are invaluable to end-users, practitioners and researchers, especially when engaged in fluid, wicked, messy type situations, guarding against the pitfalls of looking for “perfect solutions or silver bullets”.

Although the nature of public sector and the related lags in protocols of procurement, governance, transparency, does have the tendency to slow the pace of delivery, these are the very implicit assumptions that co-create the messy situations. These challenges touch upon structural fragmentation in the public sector, highlighting the lack of variety (procedural, structural and substantial) resident within government agencies and agents. It relates to Conklin’s view of the opposite of integration, meaning “fragmentation”, which according to him seem to be the combination of wicked problems multiplied by social complexity (Conklin, 2005). It appears that in practice, time constraints; resource limitations; and lack of variety across agents and agencies does seem to conspire to turn “normal” problems into “messy” problems, increasing the difficulty in taming such problems and challenges. Improvements when dealing with wicked, messy and complex problems, using, learning and understanding systemic-type solutions cannot be ignored, and is a definitive requirement. In this context trying to make systems science knowledge, tools, constructs, and theories more accessible to a layperson seem an impossible task since trying to simplify complex and systems knowledge can only be taken to a certain point, and in this experience,

makes it difficult to overcome an agent or agency's mechanical orientation and Habitus. This is further supported by the failure in sustaining ongoing positive intervention outcomes, post project closure, i.e., there must be an innate need and willingness by agent and agency, that are predisposed toward continuous learning and discovery.

6.3.2 Institutional or organisational memory & knowledge management

The inability to ensure continued use and adoption of a systems oriented practice, post project completion has been documented as a key obstacle and a serious concern in this research. It reflects Conklin (2001), citing that knowledge workers are increasingly required to: work in groups to solve complex problems; have collaboration skills; build communicative skills, all of which are a far cry from the traditional clerical and adminsitrative forebears. The lack of institutional memory as captured in this work, reflects the dynamics and concerns highlighted by Conklin's version of "organisational memory". Both variations (institutional or organisation memory) being supported by other research that recognise organisational learning and accumulation of knowledge, to become a basic requirement for survival (McMaster, 1995). The project experiences of providing a knowledge repository (electronic data, templates, documents, minutes, insights, and original project context or journey map) to assist clients, post intervention sign-off, is a step toward developing greater institutional

memory, though in this context the ongoing use and utility of the knowledge repository was low, it's importance is reinforced.

Since KM comprises many practices in an organisation such as IT systems, Administration, Management, Library and information sciences (Alavi and Leidner, 1999), whereby both agent and agency are enriched through the sharing process. The prototype repository usually consisting of templates, processes, and standards, are seen as a contribution to KM whereby agents and the agency can continue to learn, reduce redundancy, share and co-create intelligence. It enriches the practice by lowering risk for clients in instances such as - loss of key staff; high staff turnover; supplier or vendor lock-in; all of which allow clients to learn and adapt faster (McAdam and McCreedy, 2000; Thomson and Walsham, 2004). Importantly the practical experience of this work, as well as early case studies in KM recognise the importance of key dimensions such as strategy, process, and measurement (Morey, Maybury and Thuraisingham, 2002). KM and to a lesser degree the prototype, cover people and cultural sub-systems that influence behavior, and if used in a well directed manner, may provide support to change management initiatives, since these sub-systems tend to offer the most resistance to change. Core KM elements include People, Processes, and Technology, or Culture, Structure and Technology, depending upon the prevailing perspective (Spender and Scherer, 2007), which is also what the prototype promote as an integrated level of system resolution under the tactical architecture, and may prove

useful in managing change by it's very notion of integrating these sub-systems.

6.3.3 The importance of integration and implementation

The vitality of integration suggested by this body of work, including its challenges, have been identified in research, such as Bammer (2004), noting that the field of integration and implementation is characterised by: (1) relatively small research groups most of which operate outside the formal academic institutions; (2) multiple small professional associations having small-scale conferences having few links with each other; (3) no well-established high-impact journals; (4) orientation to consultancy work, which is in high demand from government agencies, business, community activists and other practitioners. She argues for greater attention and increased efforts for specialisation in this field, and identifies Integration and Implementation Scientist to ideally look at: (a) the development of theory, methodology and their practical application in tackling complex problems; (b) scoping the problem, ensuring multi-disciplinary and multi-sector involvement, and making clear where the boundaries around the problem have been set and the implications of those decisions for inclusion, exclusion and marginalisation of stakeholder groups.

Her research, like the outcome of this body of work reinforces the importance of integration and implementation, suggesting a real growing need for scientists to strengthen this area (Bammer, 2004).

6.3.4 Understanding how we learn, develop, and improve

The notion of Habitus seem important in developing solutions and creating escape trajectories from strongly embedded socio-cultural texts. The author offers his own transformation, learning and adaptation as a key example, supported by similar growth and change of other agents (performing staff members of the firm), and agencies (the limited agencies that embraced systems insights as part of their institutional reformation, like the RBEB). Although agents and agencies that have embraced change are by far the minority, it is the authors belief that the need to learn and improve, in order to remain viable on various levels of existence are not appreciated by most agents, which suggest their perspective on learning may be their biggest challenge, as they do not see it as a "life-long" commitment, but instead sees it as a single set of lessons that endure over several generations. Because of this "laziness to learn", our social structures must lead us into learning how to learn, and become centres of perpetual learning, since without continuous learning we are doomed. The results from the "2 worlds", highlight the tendency by agents, to underestimate the importance of learning, especially learning-by-doing. The inability to motivate people to learn, perform and "live systems" is perhaps best summarised by Frederick Herzberg, who established more than 30 years ago (1966, 1968), that we cannot motivate people, in fact it is the ultimate self-deception since it is not a substance we can inject from the outside. This work support his view, like experiences within the firm, where sharing of bonuses with staff that did not perform or deserve

bonuses, had been instituted to make tangible, typical rewards and incentives to help build an organisation that promotes sharing of knowledge and material gains resulting from its collective performance. Part of the expected output in creating a learning and sharing organisational culture was to observe self-regulation as a operational construct, and to promote the growth in understanding and practice of systems science to firm members. The outcome regarding self-regulation whereby leadership from all are called upon, resulted in various abuses, such as absenteeism; weak business development prospects; abuse of structural and procedural variety resulting in diffracted units and internal power-plays between firm members.

It is possible that the researcher's naïve perspective of human nature and attempting to "turn" firm members into self-sufficient leaders and cohesive units, was too much to expect from staff that did not have much systems knowledge, and a seemingly superficial disposition toward learning, practice and knowledge creation. To have expected results such as co-learning, and innovation, was perhaps overly ambitious, since the superficial gains of systems notions had been abused by firm members in various ways: selfish dominance; competitive tensions; withholding of information between agents. The divergent outcome in this regard, suggest a need for self-development and improvement to be accompanied by more qualified mentoring; better structured training; more rigid guidelines having

stronger oversight, if positive and meaningful learning and sharing is to occur.

The need to constantly "sell" the firm's vision and potential to its own team members and management, even after 5 years of being part of the firm, support the view that "learning" is seen as something separated from doing. Instead some firm members abused systems notions, such as for example: when they readily extoll virtues of systems theory in contexts where it enhances their social status, like in meetings with other agents less informed than them; and using it as a platform to dominate and impress with vocabulary. The theoretical aspects were used to raise their status and power (Habitus) in various social contexts, but were never practiced by these agents when having to execute their daily tasks. This may suggest agents to possess some form of maturity as well as an internally motivated drive to want to explore, experience, question, understand and know. The importance of life-long learning should perhaps be better formulated and incorporated as essential to personal and societal improvements, in order to reduce the misconception that once formal education is attained, learning stops. The importance of "learning-by-doing" is seen as a key outcome of the work, since the prototype compels deeper thinking and integrated planning, prior to taking decisions, whilst requiring constant review and adjustments based upon perturbations external to the system-in-focus, as well as between sub-systems.

This implies a constant learning dynamic and an evolutionary improvement process in general. The work recognises the uniqueness of entities and

contexts and suggest each to posses a unique golden thread that run through an agency's architectural configurations.

The learning and KM insights of this work correlate to efforts of many scientists, like Max van der Kamp's slogan of " Lifelong learning for all" (van der Kamp, 1999), which brought the notion of lifelong learning to the forefront of the international policy and educational agenda (OECD, 1996); and "Learning the Treasure Within" a report by the UNESCO (Delors et al.,1996); supported by the European Union declaring 1996 the "European Year of Lifelong Learning". However, in practical terms it is lagging far behind with big differences between countries, regarding policy and practice (EC, 2002). This global insight have direct appeal to one of the outcomes of this work in the sense that knowledge or education tend to be seen as a once off exercise, usually executed in earlier years, to be applied in later years. This perception ingrains a "laziness to learn and adapt" which reduces the fitness and variety of agents and agencies of social systems. Locally, this is a highly under-rated issue, requiring immediate attention since the cost of such practices hold severe penalties for development in every sense (poor skills in Engineering, Health, Education, etc will result in having future services and products that are poor and inferior, creating reliance upon external support).

Systems-based implementation and organisational change are generally seen as a threat as it introduces new ways of doing things, increasing uncertainty in general terms for individuals. This may also be the reason why system type implementations tend to confuse and create discomfort within client domains since it crosses organisational boundaries, and are erroneously seen to impinge upon areas outside of the scope of the work, and outside of the influence of the project sponsor. The transversal nature of systemic implementation and organisational change, are seen by potential adopters as threatening, creating various forms of resistance, which result in lowering the variety of both agent and agency (structural, procedural and substantial variety).

6.3.5 Systems Practice

Systems thinking and practice are increasingly concerned with two primary areas, i.e., systems methodologies, and systems theories. While systems theories seeks to formally describe certain classes of systems (e.g. complex adaptive systems), the systems methodologies tend to focus on implementing an interactive process in order to bring forth instances of some class of systems. In a small way, the prototype appeals to both of these areas, and hints to the crucial survival process of the interlocked adjustment of internal chaotic dynamics of systems (prototype architecture), to the chaotic dynamics of the environment (context or EVC), referred to organisational autopoiesis (Dimitrov & Fell, 1999). The notion of

promoting multi-methodologies and perspectives of soft and hard systems, currently contained to varying degrees in sub-system content of the prototype, support a pluralist orientation, and highlight unnecessary competition of one method or tool above another. It also suggests that an integrative framework may hold much potential value, and that such a Herculean task may be diminished and dismissed far to rapidly.

Attractors is another concept this body of work attempted to understand, seen as "organisational configurations which demonstrate regularities in their macro-characteristics even though they may reveal large differences in their internal processes" (Thietart, 1995). The non-linear nature and dynamic of any business highlights the difficulty in addressing challenges from a mechanistic perspective. So interwoven and entangled are the factors influencing organisational dynamics that it appears impractical to define which factor or combination of factors caused the observed effect. The emphasis is on understanding the process whereby a multitude of factors influence organisational dynamics. In chaotic systems, one cannot pass through the same coordinates twice, similarly, in organisational management; a decision will never be made under the same set of circumstances or events. This has been known to create problems in management practice (Gajendragadkar and Johnston, 1977), explaining that decisions that presented beneficial results in the past may not necessarily do so again. The prototype clearly support this position by proposing dynamic interplay of sub-systems between themselves and the

environment, citing the unique “golden thread” that runs through the architecture of a specific entity. This implies that the nature, arrangement and the extent of the prevalence of core sub-systems, will be unique to each context and agency, which will additionally always require review and refinement based upon its internal and external dynamics. In other words, the prototype advances the move away from the common management notion of having a “silver bullet”.

This aspect underscores as its secondary point, the importance of innovation, creativity and systemic appreciation of organisations and the interventions they undertake, whereby potential action and decisions may be more adequately exposed and anticipated. This capacity fosters an improved sense of practicing self-regulation; and self-organisation. Whilst it remains a very difficult challenge from this specific field experience, as results suggest a certain level of systems maturity for self-regulation to be effective, the notion itself appears to hold advantage in terms of its “humanistic” viewpoint, fostering team-sense and equality. The self-organising agency does not respond to every fluctuation from inside or outside the organisation, instead it possesses the internal potential and energy to break with existing symmetries and methods when positive fluctuations occur. This internal potential is the basic resource of the self-organising agencies that agents are to foster and develop (Kiel, 1994).

6.3.6 Management Studies

A large component of organisational management concerns understanding the "human" element. Looking at the people aspect alone, it is clear that the variety and degrees of competence, innovation and creativity resident within people present a challenge in itself, specifically relating to consistency of performance and efficiency. From a systems viewpoint it has been argued that it is not a singular aspect (usually tending toward remuneration) that will bring forth such performance and value, but rather a deeper commitment embedded in a combination of parameters. The example of the firm relating to incentives have proved, at least in this instance that people needs are extremely complicated and as such require detailed understanding and investment. This typically touches upon the level of resolution of the proposed model that deals with people (people architecture), and links strongly to the very real and tangible effects of Habitus.

The notion of language and communication, as evidenced in this body of work suggest careful adoption of systems and complexity terms, especially since people have a tendency to take these and stick them onto their old, familiar entities and practices, causing even greater problems, as it assists them in their defense against having to learn, whilst allowing them to showcase their apparent leadership (Beer,1984). The importance of systems terms spur innovation and "emergence" that can arise in conducive working environments, touching upon the need for "requisite variety", i.e., the greater the team variety, the greater the emergence of

innovation and enrichment for stakeholders. The building of, or the increase in “requisite variety”, have been tested in this fieldwork, but yielded poor results from agent uptake. Cybernetician Ross Ashby famously put it, "Only variety can absorb variety" (Ashby, 1964), underscoring the importance of nurturing and building variety. This work underscore two vital aspects, i.e. the pervasive “laziness to learn” – whereby practical systems knowledge may be offered, but are not really internalised by agents, and instead prefer to be given solutions, as opposed to co-create them. Secondly, the inability and reluctance of agents and their agencies, to retain system specific institutional memory, post successful implementation of interventions. The prototype stimulate revitalisation and reorientation in management studies, and emphasise capacity building by focusing upon the ability to define problems (Ackoff, 2001), particularly since problem definition seeds all action (i.e. because most problem statements are usually unstructured and misunderstood, resulting in poorly developed action plans).

6.3.7 Future Directions

A number of topics may have to be addressed in future, in order to explore the potential of the prototype and to enrich it further. The obvious area of improvement is that of the current content of the various levels of resolution of the prototype, and the potential each level may present for future research. Another area of potential relates to developing a “quantitative” aspect to the prototype by deriving levels of compliance for small, medium or large enterprises, which may be realised through various

ideas and innovations arising from several research fields, especially those concerned with the study of some type of collective phenomena, known to manifest itself at different levels and domains of reality. Thus, whilst the prototype in this study may not present itself as any final version of a business architecture, the intent is to stimulate such thought and possibilities.

“For managers, the dynamics of knowledge impose one clear imperative: every organisation has to build the management of change into its very structure” (Drucker, 1992). Expertise in organisational design is a critical skill for future leaders, one that will require considerable technical knowledge about how to analyse, modify, and simulate the behavior of complex human systems (Stata, 1989; Senge, 1986; Forrester, 1971). The lack of a viable organisational architecture is also expressed by Mintzbergs “Enterprise Architecture”, explicating configuration theory using his seven principles, which if not managed appropriately can allow one of these forces to dominate, resulting in a greater challenge to shift locked-in patterns, e.g. the quest for efficiency can stiffle the capacity for innovation (Mintzberg, 1991).

Systemically integrated phenomena are known to arise at various levels, from the sub-atomic, molecular, organismic, and social/cultural levels. Perhaps another apt systems definition, can be used to support the notion forwarded in this body of work: “a design approach dealing iteratively with structure, function, and process” within a specific context (Gharajedaghi, 1999) supporting ongoing research that may provide a number of ideas to

improve and enhance the prototype. The integration challenges may be better highlighted when contrasting such a need of improvement, to the highly heterogenous distributed network architecture of complex systems, whereby the presence of such small-world phenomenon, i.e. highly heterogeneous connectivity patterns (Albert and Barab´asi, 2002, Bornoldt and Schuster, 2002, Dorogovtsev and Mendes, 2002, 2003), may indeed present insights to improve integration across social networks, whilst sets of possibilities fits well with evolution dominated by intrinsic constraints (Jacob, 1976; Alberch, 1989; Kauffman, 1993; Goodwin, 1994).

6.4 Limitations and key assumptions

An important limitation of the work relates to the content of sub-systems at lower levels of resolution, as much are based upon common practices and prevailing management principles. Although the thesis does not purport to present the detail as key output, since there are numerous versions and variations to the content, and as such the work does not make claims in this regard.

It is believed that should such a framework be adopted, then a key step would undoubtedly be the improvement and synthesis of the content of the prototype. Also, the need to have systems knowledge in order to use and understand the prototype, is a distinct limitation, requiring additional work. Other assumptions relates to:

- The various positive project supports the credibility of the findings;
- The suitability of the range and scale of project applications, supports transferability;
- The overall research framework and the action-led research, provide sufficient support in claiming trustworthiness of the body of work;
- Language and systems understanding cannot be transferred unless a predisposition toward learning exists, reducing the potential gains of systems-based tools, techniques and methodologies in practice;

VOLUME 2:

Supporting data for thesis (volume 1)

TITLE: Business Architecture Tool (BAT):

Development and Assessment of a systemic framework to guide organisations from concept to delivery, in terms of creating deeper and meaningful integration across processes and functions.

AUTHOR: Fuad Udemans

A thesis submitted in fulfilment of the requirements of the University of Cape Town, South Africa, for the degree of Doctor of Philosophy, December 2008.

UNIVERSITY OF CAPE TOWN

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Structure of the Volume 2

The nature and the second volume is purely for support and detail otherwise omitted under volume 1 due to requirement constraints. Volume 2 is thus in support to one or more of the chapters under volume 1. The structure of volume 2, mirrors that of volume 1, and can be summarised as:

Appendix A – is the "*reference list*" reflecting the complete research and reading material used, accessed and quoted in this body of work.

Appendix B – is the "*list of organisations*" and contact detail that have participated in the action oriented implementation projects ellaborated upon.

Appendix C - is the "is the "*list of figures*" relating to the diagrams residing under volume 2.

Appendix D – the "*prototype"* (BAT), as the 3rd revision, based upon the lessons and improvements across the longitudinal period of study.

APPENDIX A:

List of reference reflecting the complete research and reading material used, accessed and quoted in this body of work.

A

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APPENDIX B:

List of specific organisation where action research projects were executed in South Africa.

Organisation:	Office of the Accountant General
Contact:	Mr. I. Mammojee
	ismailm@treasury.gov.za
Title:	Accountant General
Project name:	FMIP
Organisation:	Department of Social Development
Contact:	Ms. R. Ally
	rehana@dosd.gov.za
Title:	Director (Grant Administration)
Project name:	Temporary Disability Grant (TDG)
Organisation:	Royal Bafokeng Economic Board
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APPENDIX D:

Detail of proposed model (BAT-3)

A note on using the framework

The deployment is embedded in the BAT framework design, reinforcing the fractal-centric design appearing at various levels of resolution. The iterative deployment method adopts typical systems parameters, under the conventions of: Consult, Design, and Deliver.

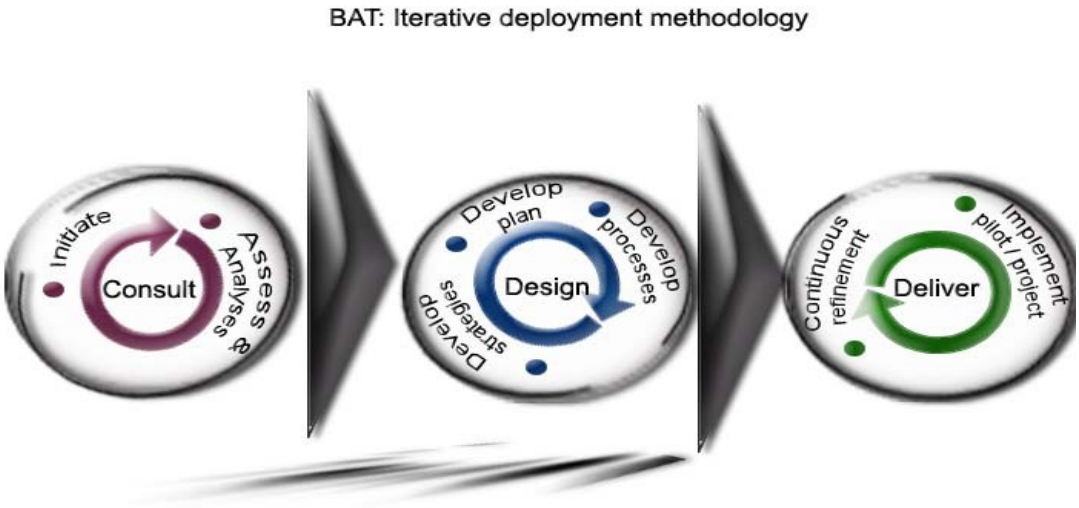

Figure D1: Deployment methodology taken from the BAT software

The ideal deployment steps to be followed are indicated above, and represents a shortened approach of the more detailed programme management model, contained in the operational architecture of the proposed model. Some of the detail under each of the three steps are highlighted below, in typical BAT structure. The purpose of which is to create familiarity with the architecture that reveals itself throughout the model.

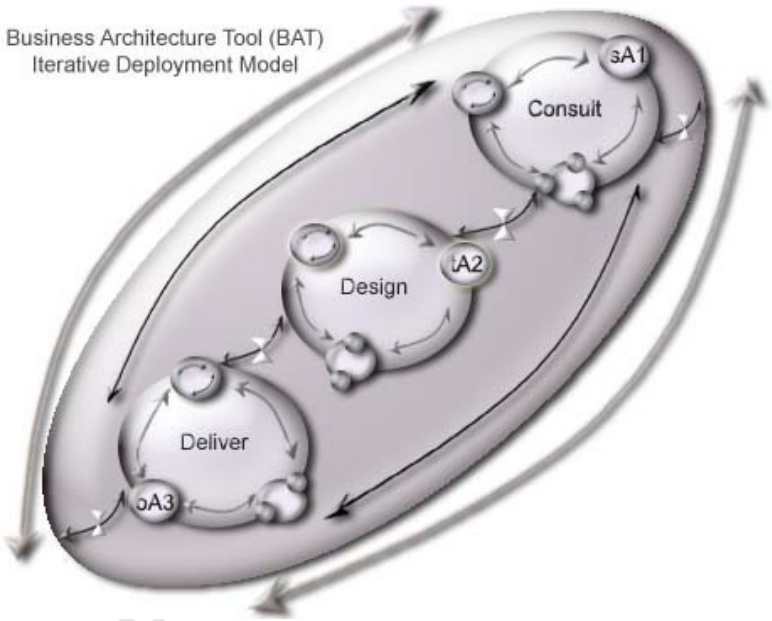

Figure D2: Deployment methodology taken from the BAT software

Consult phase:

During the "consult" phase, the "system-in-focus" is clarified and agreed upon (i.e., defining the project scope, or the "system-in-focus" which is to be the intervention's purpose). This phase include consultation, research, interviews and related documentation survey's that are applicable to the intervention, usually when the project is formally initiated. The development of the "rich picture", is developed here, taking the environmental context parameters in consideration (i.e., external nodal points such as third party interfaces, legislation, funding, procurement, resource constraints, etc). Importantly, it looks internally as well, mapping the intervention against the organisations internal capacity regarding Strategic Architecture, Tactical Architecture, and the Operational Architecture. The assessment and analysis is synthesised and provide input into the next phase. The consult phase thus have two key supporting sub-systems;

Initiate – where the intervention is formally initiated, and contains the sign-off of important governance related matters (terms of reference; draft service level agreement; steering committee member nominations and adoption; minute and reporting formats; project contact list; payment conditions and mechanisms, etc).

Assess and Analyse – this segment reviews the extended value chain, covering both the "external environment", and "internal environment". The assessment provide a "*systemic map*", providing a rich display of key parameters impacting the intervention, directly and indirectly.

The information is collected and collated via interviews, discussions, document reviews and research. The review of the external environment include industry specific information; threats, competition, sensitivity to high level extended- value-chain (EVC) parameters. The internal assessment and analysis is where the BAT framework is used for a reference point, obtaining client information relating to the capacity and robustness of their Strategic, Tactical and Operational Architectures. All of this information is presented in a "systemic map" , which is a high-level view of major nodal points impacting the initiative and the organisation.

The diagram below depicts the "consult sub-system", and its supporting sub-systems, as per the BAT architecture.

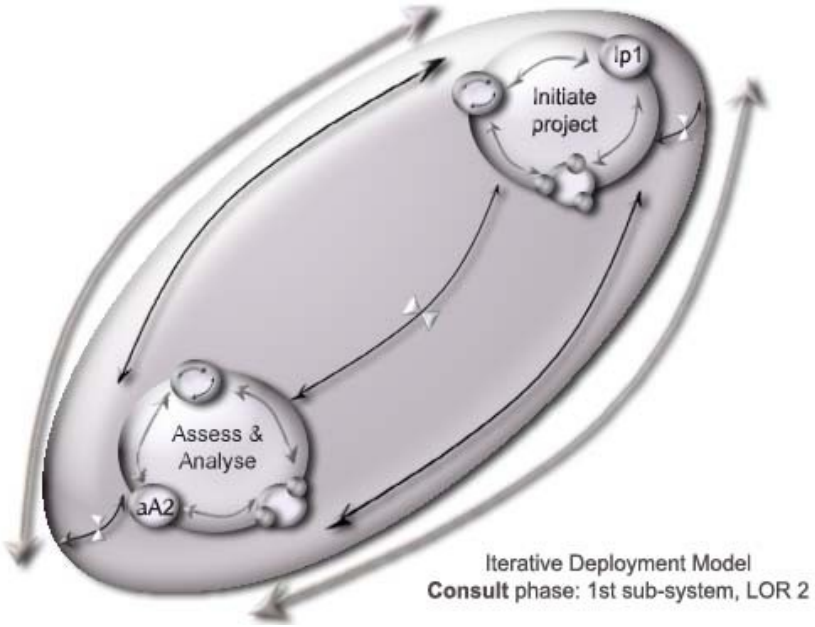

Figure D3: sub-system of deployment methodology taken from the BAT software

Design phase:

This phase uses the rich "systemic map" to develop a strategy for implementation. Interfaces are highlighted, discussed and raised with stakeholders, creating awareness of the planning. Once this is achieved, the development of the final delivery and engagement processes are developed and signed off. All this information allows for the base-line planning to present the ideal, theoretical or "blue-sky" plan. Key steps in this process relates to: developing the intervention strategy; development of delivery and enagement processes, and the development of the first detailed implementation plan.

Develop implementation strategy – this segment involves taking stakeholders through the "systemic map" to explain the nature and implications of decisions and action to be taken, with the adoption of strategies being a vital deliverable of this stage.

Developing the engagement and delivery processes – this segment relates to defining the procedures and protocols that need to be observed during the execution of the initiative. This is an important element since much delays are usually introduced by ignoring these aspects.

Develop plan – this segment takes all the work of the previous stages and proceed to develop a detailed project plan. This plan serves as the base-line, with deviations and amendment to any aspect thereof, following a very specific process in itself. Figure E.4, depicts the abovementioned in context of the BAT framework.

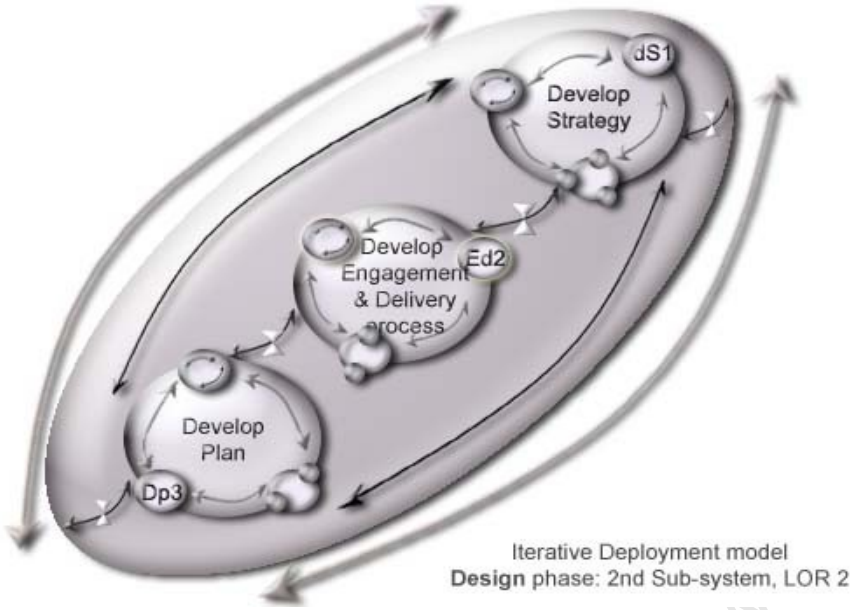

Figure D4: sub-system of deployment methodology taken from the BAT software

Delivery phase:

The delivery phase is where the planning is executed, containing two steps: implementation; and continuous refinement. The focus is thus upon the management of the team, promised milestones and objectives, within the desired quality parameters.

Implementation – this segment is where the BAT's programme management model is activated (see Operations Architecture and its sub-system), covering the entire journey of the initiative, needing diligent programme management and exception reporting.

Continuous refinement – this is the feedback aspect of the model, and represent the area where improvement/s are recorded, suggested, agreed and actioned.

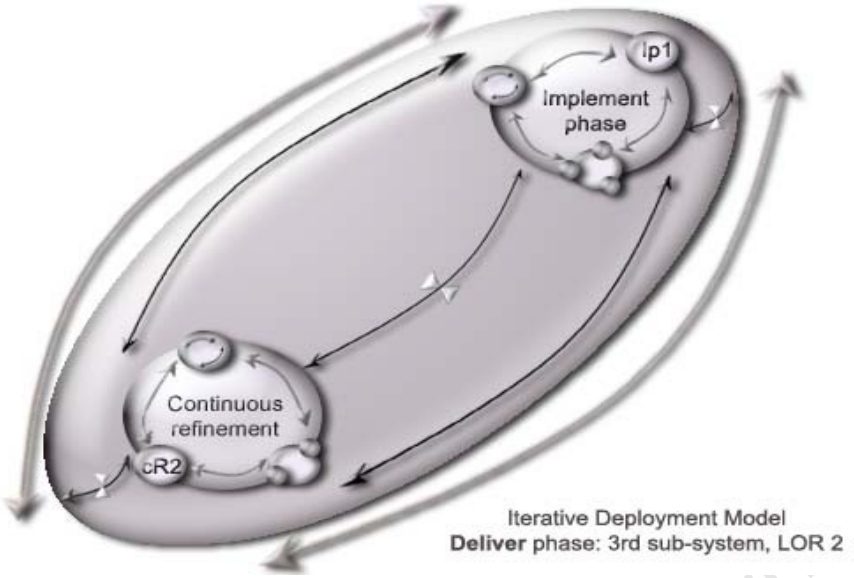

Figure D5: sub-system of deployment methodology taken from the BAT software

These three steps represent the iterative deployment plan, ensuring a robust, well thought plan of action, allowing learning to be constantly infused into the deployment, ensuring an improved quality function. The view adopted is to fuse typical system engineering parameters, with minimal but requisite governance constructs, having a "lightweight", yet robust approach to solving practical problems. The term lightweight alludes to the departure from the traditional volumeous documentation, yet ensuring high quality and integrity.

The detailed framework (BAT)

The proposed Business Architecture Tool, promotes the exploration of social structures, through a nested systems and system-in-focus (SiF) concept, thereby attempting to represent the myriad of events as they manifest themselves. Since these events appear to us, as complex and chaotic, the framework intends to aid in ensuring these factors are managed as multiple interacting systems, whilst retaining a keen sense of which aspect of the system are being dealt with (SiF), and the potential consequences of actions and decisions, it may have across the emergent whole.

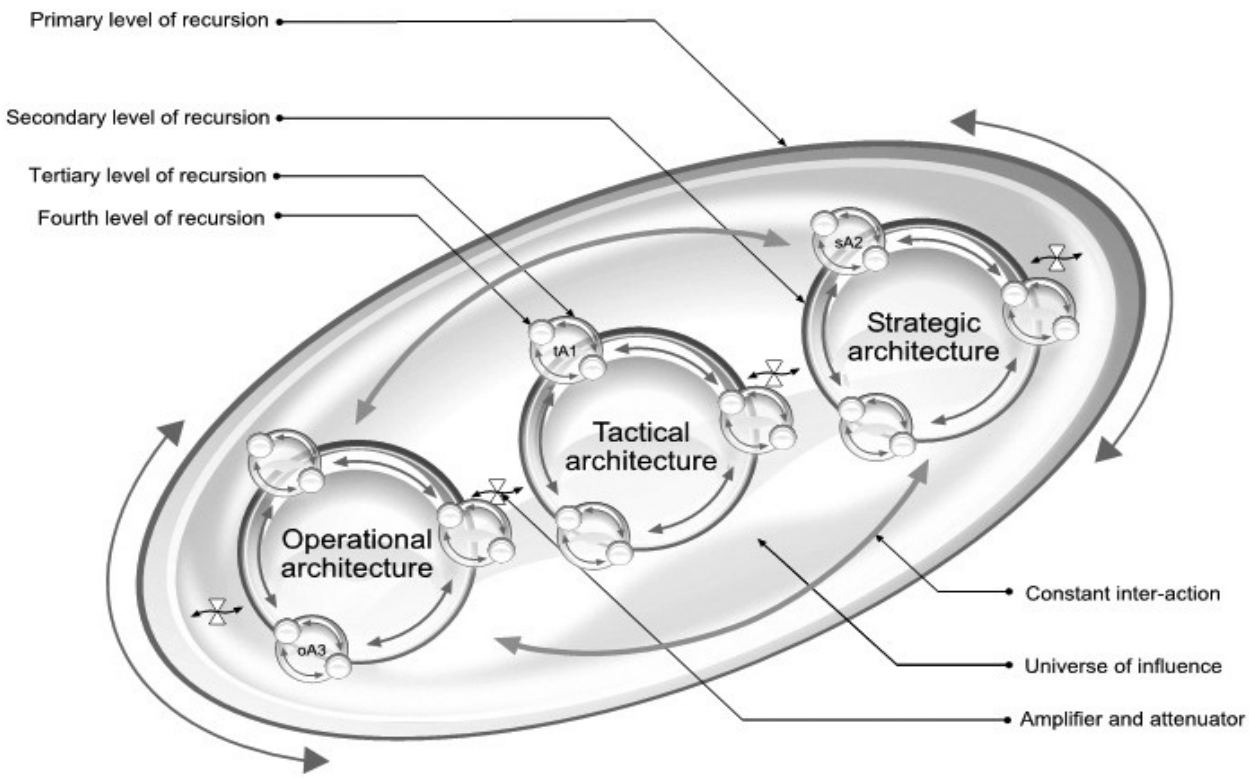

Figure D6: Unpacking the BAT design elements

The framework as suggested above reflects the concept of systems within systems, and the notion of system-in-focus. This is reflected by the bigger elliptical shape (system-in-focus), and conceptually can be applied to a complex entity such as an organisation as a whole, or part thereof, or even a project undertaken by the organisation, i.e. the choice being the system-in-focus (scale independent). The sub-systems occurring as constituents of the system-in-focus, are in fact systems containing further levels of granularity (sub-sub-systems), each impacting and acting on each other to yield the emergent phenomena. Each of the sub-systems, which to level of resolution 7, enjoys the same fractal-centric design, specifically the boundary of the system-in-focus; constitutent sub-systems; as well as the attenuators and amplifiers between and within sub-systems.

The primary system (system-in-focus), being the “Business Architecture”, suggests three supporting sub-systems (Strategic Architecture, Tactical Architecture, and the Operational Architecture), each of which have multiple sub-systems, supporting them. The detail resident under each of these sub-systems are expanded upon below.

Strategic Architecture

The strategic architecture is the first sub-system and has been populated with accepted concepts, processes and theories (as is the case with most of the content of the proposed framework).

In terms of the recursive nature of the model, the strategic architecture is cascaded to its core sub-systems, leading to a composition of typically, the vision construct, the mission construct, and the strategic objective construct, goal construct, milestones and deliverables construct. Each of which, will in turn be supported by their respective sub-components. Whilst the system-in-focus is still the organisation, the sub-systems clearly display and support the notion of integrated relationships across the business architecture. In other words, these are the key components resident in the design of the strategic architecture appearing at its lower level of granularity.

Taking the model to a lower level of resolution, the vision construct would typically contain, as its key supporting processes or sub-systems: Analysis of the company's future landscape; Analysis of the company's capacity and human capital; The organisational and management value system. These three processes are vital support mechanisms for the "parent" or preceding, higher level of resolution.

A sound vision is required to address, as a minimum, those three areas which support and underlie it. If executed with the required rigor and dedication, it will yield an achievable and viable Vision construct (i.e. a vision with contextual meaning and purpose). Similarly, will each of the other constructs have a number of supporting levels of resolution, providing its predecessor credibility and impetus in achieving the overall purpose (the vision of the organisation), aiding the integration and interrelated nature of the model, rouching upon the dynamic series of activities and actions at lower levels of resolution, all of which should be ideally aimed and aligned to meeting and supporting the “vision” of the intervention.

This aspect seeking to elicit the concept of emergence, into the model, by having all activities of the organisation or project aligned and integrated. It allow stakeholders to see how and where they fit into the “broader scheme of the operations” thereby tapping into their collectively orchestrated efforts. The following diagram represents the Strategic Architecture in a schematic fashion. The diagram alludes to the interdependencies within the sub-systems, and the constant interaction between the parts, introducing subsequent adjustments, based upon the learning of the system (self-regulation and adaptation).

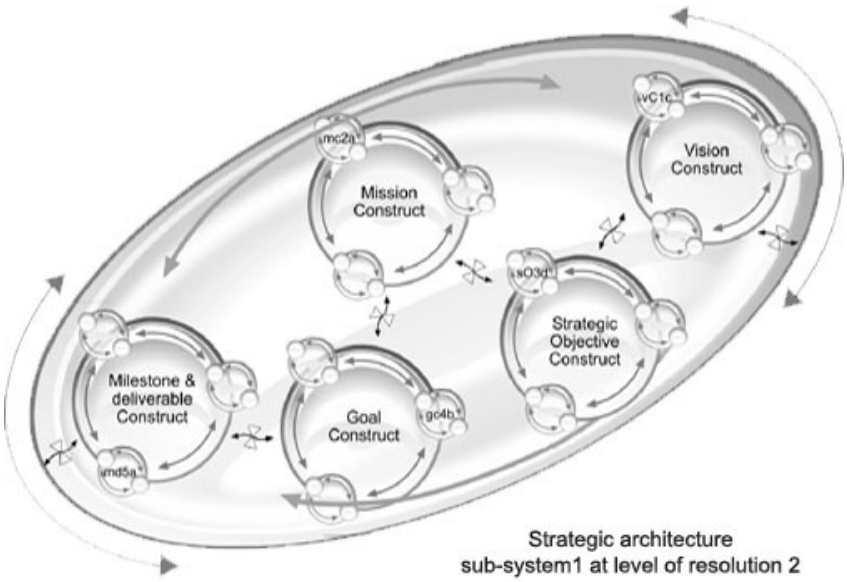

Figure D7: Strategic architecture taken from the BAT software

The Figure D7, highlights the sub-systems that comprise it, as a set of integrated and interrelated components. The strategic architecture thus is a function of the vision construct (vc), the mission construct (mc), the strategic objectives construct (soc), the goals construct (gc), and the milestones and deliverables construct (mdc), yielding the notation: “Sa = f(vc x mc x soc x gc x mdc)”. Each of these supporting components are unpacked, as part of the lower levels of resolution of the model.

The vision construct

Various people, executives, and managers, have different interpretations and meaning they attach to both the understanding of a vision and the purpose of having one. Key in living or driving a vision is that it must be understood by all

– it must be unambiguous. Another key aspect is the ability to relate to the reason for having it.

It is more than words, and must reflect the envisaged end-state of the collective, ensuring support from management, staff and others, to rally behind the vision. There still exist extreme interpretations of what a vision ought to be; two common ones are:

(i) The organisations current product and service offering – what we are currently selling and marketing;

(ii) The "wish-list" i.e. some firmly believing that a vision must be something impractical, intangible and out of reach;

These two extreme views are indicative of the interpretative gap of what a vision ought to be. To avoid a debate on this subject, we will clearly define what we deem as being a vision:

"A clear and unambiguous statement of what the business can and most likely should be, within a specific timeline".

This definition is most commonly adopted, and enjoy a certain level of consensus in the field, the only variable being the issue of the timeline (the debate seem to be on the length of time allotted in realising the vision, be this three, five or ten years?). Some organisations may have a shorter period attached to their plans than others would; consequently a pre-determined timeframe would not be conducive to a generic definition. Key to the vision is that it must be clear and supported within organisation. Thus, timing is of

lesser importance in the overall scheme of the vision, it is the sense of collectively focused effort that must be harnessed.

Core to defining a vision is describing the shape of the future business, and allow for setting of specific strategic objectives (goals) and the championing of the strategy (Wilson, 1999). Important to introduce into the vision development stage is the concept of inviting "outsiders" – i.e. individuals who does not know the business itself, who can add value in terms of bringing in greater objectivity and non-partisan mindsets, thereby providing a different vantage of the business (i.e., adding greater variety).

This will enhance the final result of the exercise and allow for greater discussion and interrogation of issues of importance. In the development process of the vision, three core issues must be adhered to, these include:

(i) Analysis of the company's future landscape;

(ii) Analysis of the company's capacity and human capital;

(iii) Prevalent organisational and/or management value system;

These steps will ensure a well articulated, and thought-out vision that lends itself to being a derivative of the current and core business as opposed to being disjointed. From this point forward the model moves into the "mission" level of the strategic architecture, which can be considered the second sub-system at the second level of resolution. More detail on the three core steps regarding the vision statement follows and typically would include the following supporting activities:

Analysis of the company's future landscape

In determining a likely future landscape consideration must be given to scenarios of future market conditions, competitive conditions, stakeholder expectations, socio-political requirements and global issues. This in turn will provide ideas of what the then market will either "force" or "allow" organisations to do. Key is to always remember that the future is indeterminate, and hence in building scenario's we often run the risk of blindly believing in them at all cost. Because of this indeterminacy, our planning efforts are mere exercises in possibilities. It is because of such sentiments that many organisations become frustrated when their best efforts do not materialise according to such planning dimensions.

Analysis of the company's capacity and human capital

An important and vital step, is an honest and true review of the current capacity and skill level prevailing in the organisation. The output of such a review will yield a snapshot of the current intellectual property (IP) and knowledge capital within the organisation. This can aid in the establishment of the knowledge capital "gap", regarding the current versus future required skill-sets.

Organisational and management value system

A number of management teams believe that a value system is more caused by the actual management and leadership styles prevalent in the organisation, as opposed to being a set of beliefs, to be instituted and articulated on a continuous basis. This does not suggest firm doctrines, but rather clear boundaries and parameters to allow for emergent properties, and may be supported by the notion that we operate in two phases: “normal; and leadership” phases, and as such, all staff should and can lead (Quinn, 2004). Clarification and communication of important organisational values is key in obtaining desireable behavioral patterns, which are required to ensure that some form of structure is adhered to, creating greater integration, in the execution of tasks ranging from the easiest to the most difficult. Should such a value system not exist, it may easily lead to disruption on all levels (e.g. risk profile on projects and financial matters; management styles, ethical sales and marketing, etc), of organisation.

Mission construct

Following from the vision, the mission is the second sub-system appearing at the second level of resolution of the model. In general terms the mission must state the purpose of the business, as well as the arena's it will engage in business. Still adhering to the recursive, and integrated nature of the design architecture, these two areas therefore receive direct input and guidance regarding content, from the vision exercise (i.e. cascading or interpreting the vision into a form that is "less vague"). This is also conducive to ensure the planning segment of the architecture (strategic architecture), have robust linkages to the subsequent, more tangible processes and workflow. At this stage care must be taken not to introduce services and products into the discussion. The requirement or output needed at this juncture is merely to articulate the market and customer needs which the organisation intend to satisfy in its pursuit of creating value. The more detailed approach will be dealt with at a lower level of resolution. The major objective of this segment of the model is to address to following vital questions appropriately: Purpose of the organisation; Markets or areas of business, which it will focus upon. These two questions must be pondered and answered adequately since the responses to these questions have a direct impact on subsequent actions, particularly in view of the integrated systemic structure being promoted by the framework. Regarding this sub-system, some of the important detail resident within it, would include, as a minimum, the above two points.

Purpose of the organisation

The purpose or reason of the organisation's existence is of primary importance, since it provides a sense of what it does, what it sells, what it claims it is good at.

Areas of business

This provide a sense of, too whom the organisation will be selling its services and or products. Defining the areas of business clearly, help to map and set the scene by limiting the population of opportunities in the market place, enforcing an early form of "attenuation" or filtration of opportunities. It assists in terms of being a mechanism for focused effort (across core business functions such as research, development, sales and marketing).

The following diagram represents the abovementioned in terms of the systemic model. In terms of the annotation being used, the mission construct is a function of the Purpose of the organisation and the Area/s of business: "mc= f(po x ab)".

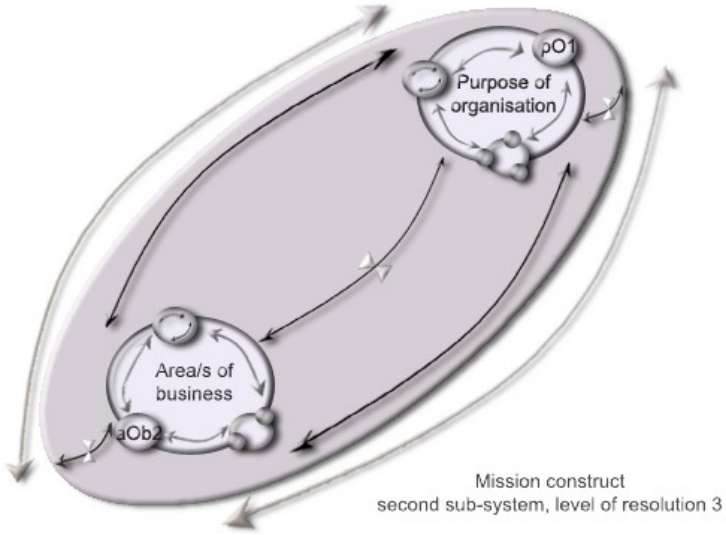

Figure D8: Mission construct taken from the BAT software

Strategic objective construct

The strategic objectives construct, is where the essence of the vision and mission are interpreted as a number of high-level imperatives or programmes. The strategic objective construct, receive input from the mission statement in terms of its broader focus, which help to underpin the content and focus introduced by the mission, which in turn is derived from the vision. The development of strategic objectives is linked to the “purpose of organisation” and the “areas of business” (sub-systems of the mission construct), and via the feedback principles, have an impact on the success of the firm and its brand.

Defining the areas of business clearly, helps to map and set the scene regarding opportunities in the market place ("attenuation" or filtration of opportunities), reducing wastage of time in pursuing opportunities that are ill defined and ill conceived. The following diagram represents the abovementioned in terms of the architecture, to observe the consequences of decisions and actions in terms of their systemic effects. We can describe the strategic objective construct as being a function of the number of strategic objectives or programmes. This can be written as: "Soc = f(so 1 x so 2 x so "n")".

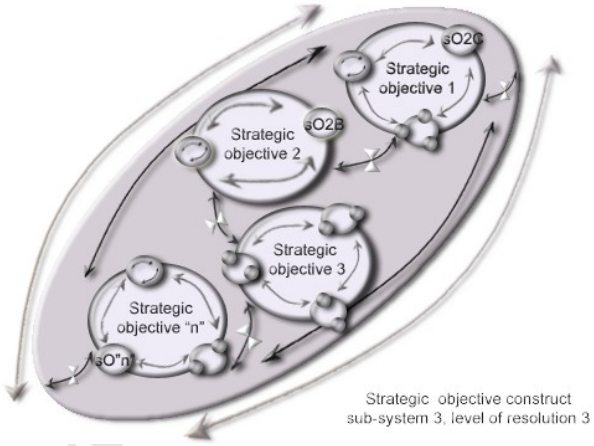

Figure D9: Strategic objective construct taken from the BAT software

The Goal construct

The Goal construct is the supporting sub-system that underpins the strategic objective construct. The recursive structure require focus on the goals, to be identified and integrated across the architecture, allowing the emergent properties to unfold, via the interconnected linkages. This segment of the architecture is where planning issues become practical and actioned in terms of daily activities, and indeed how these activities support and impact the system-in-focus (business). The important aspect in identifying the underlying goals to the various strategic objectives lies in the interpretation of each of the strategic objectives into a range of specific goals that support and underpin the context and content of each of the strategic objectives.

The goal construct is thus comprised of a number of goals under each of the strategic objectives developed. It must be noted that each of the goals, may support more than one of the strategic objectives, particularly when taking such an integrated view. The goals construct is thus a function of the activities resident under each of the strategic objectives. “Gc = f{(gxso1) x (gxso2) x (gxso “n”)}. See diagram below depicting the goal construct.

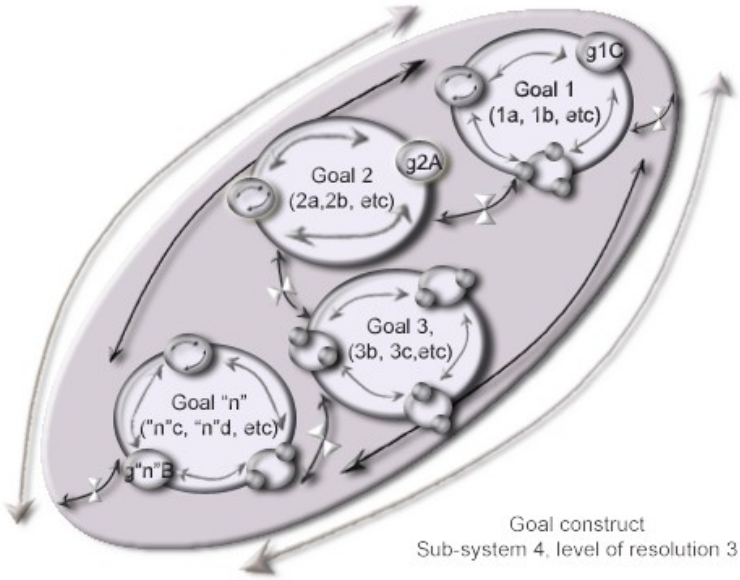

Figure D10: Goal construct taken from the BAT software

Milestone and deliverable construct

The milestone and deliverable construct are derived by taking the various goals and refine them further in terms of their respective actions and content, yielding more detailed activities. These are ideally the daily activities undertaken, in order to achieve the plans crafted during the strategic process. Consequently, in terms of the model, this is yet another iterative layer of integrated refinement. In viewing activities in a systemic context, allow individuals to see where and how they contribute to the success of the organisation, ensuring sight of interdependencies and interrelatedness of their activities within the system-in-focus (easier for directors, managers, employees, to see how their efforts are enhancing the business of the larger organisational system, by focusing on the deliverables and activities within their divisions, departments, sectors, business units, etc).

The milestones for the purpose of this model can be defined as an activity that belongs to a group of activities, supporting a goal. There may be many milestones that must be attained, en-route to achieving a specific goal, this is dependant upon the complexity of the goal or the frequency of the "checks and balances" contained in the process of meeting the goal itself. A deliverable is the smallest activity item or action contained in a milestone, i.e. the lowest form of an activity.

The milestones and deliverables each support one or more goal at any given time, thereby connecting the daily activities to the strategic intent of the organisation. The milestones and deliverable construct is thus a function of each of the goals, and can be expressed as: "mdc = f{(g1/so1) x (g2/so2) x (g"n"/so"n")}". The diagram below depicts this segment in terms of the architecture model.

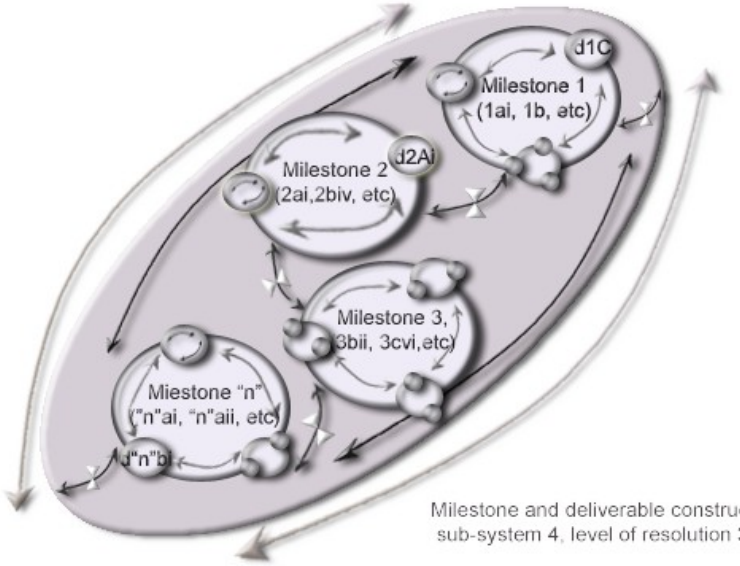

Figure D11: Milestone and Deliverable construct taken from the BAT software

Tactical architecture

The tactical architecture is the second of the three tiers of architecture contained within level of resolution 1, and concerns itself solely with the constituents, which are essential elements in the running of operations, or its enablers. The tactical architecture is comprised of three core sub-systems, on a lower level granularity:

(i) Process construct

(ii) People construct

(iii) Technology construct

These three supporting sub-systems are each levels of resolution contained within the tactical architecture – sub-system 2, level of resolution 2. A robust tactical architecture can only be such if it contains the basic elements of a process, the people doing the work, and the supporting technological enablement. These three enablers together provide the support for the tactical architecture. The combination of how these three sub-systems are employed may depend upon the maturity of the industry, expertise of the people, and a number of other issues specific to the organisation and/or the industry. The Tactical architecture can thus be described as being a function of Process architecture, People architecture and Technology architecture, and may be depicted as: “Ta = f{(Pra) x (Pea) x (Ta)}”. The following diagram represents the Tactical Architecture in a schematic fashion.

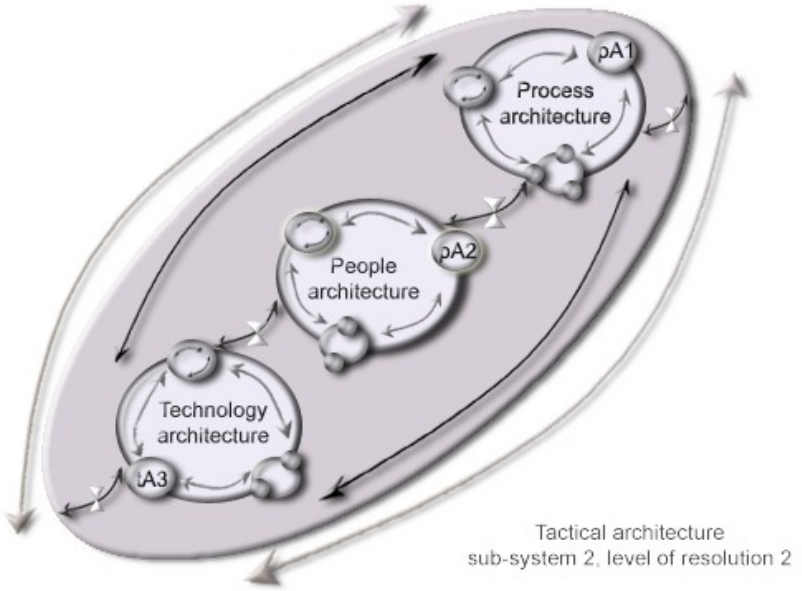

Figure D12: Tactical architecture taken from the BAT software

The constant interaction between the sub-systems, and the subsequent adjustments we make result in the dynamic operational impact. It is often that we inadvertently make mistakes by deciding on say implementing a new software solution with the aim of introducing efficiencies, but obtain results that are not reflective of the intent of the decision. Being acutely aware that decisions made in this sub-system, impacts both the other sub-systems, all of which have a multiplier ripple effect throughout the organisation. Thus, deciding on software, we must weigh the impact it has across the People and Process architecture, if we are to maximise such investments. These represent the basic enablers or building blocks of any entity.

Usually, little attention is afforded to them in terms of being an integrated set of components (tactical architecture), despite it providing the execution foundation of all organisational directives. Most managers view these components as separate and tend to give only one of the three any real attention. Consider as an example, senior managers which have a bias (based upon his/her initial conditions) toward say technology. Technology will in his/her view be the primary provider of value in terms of meeting his mandate, be it a financial system, a procurement system, an asset management, or supply chain system, etc. The "built-in" bias will naturally push them toward getting the best technology, in order to extract efficiencies from the automation.

There may be nothing wrong with this concept since technological enablement is supposed to enhance the business. However, this position is usually taken at the expense of process and people issues, often resulting in "IT" being blamed for the eventual non-delivery and failure of technology implementation projects. Technology has two, direct enabler inter-dependencies, one being the interaction of the technology with the human (people) element involved. The other, from a tactical architecture perspective, being the organisational specific flow of work it follows in performing its functions (process). These three enablers operating in concert is what can yield an efficient tactical architecture.

Being sensitive and aware of the three enablers, it becomes apparent that it would be not be an optimal approach to focus predominantly on only one of the three enablers, since value creation can only be exacted from the three components together. It implies further that the better these three components are integrated, the greater the efficiencies and effectiveness can be obtained from such an optimised systemic view. It is the understanding of these three components, which will allow management to relate to the inter-dependencies of these sub-systems, and consequently lead them to understand that the one cannot be addressed without the others or in isolation of them.

Often the procurement of technology leaves organisations with a bad taste, as they tend to pin their hopes on the actual technology to bring forth the much-desired efficiencies. This is not because technology failed, technology works, but works within context of process and people. Knowing the current business processes will allow the technology to be used optimally, also, having the properly skilled people, will lead to the required value-extraction from the technological investment. Additionally, in most of the robust software solutions, one usually find that the software contain a number of the core organisational processes built in (e.g. Financial controls, procurement, HR, payroll, etc); however, the organisational business rules and processes are usually unique and would require either changes in the software or changes in the actual business processes. The choice, in such a situation would depend upon a number of constraints (e.g. cost, timelines, skills in the organisation, etc). This again points to the need of an integrated and systemic view of the tactical architecture.

Similarly a strong focus on people, at the expense of process and technological enablement will also be a mistake since the model proposition requires these three components to be viewed as an integrated architecture. A senior manager with a strong bias to people, may indeed compromise a successful outcome due to his over-concentration on the people aspect. So too would a process engineer or process specialist be blinded to the importance of incorporating people and technology into his mandate without consideration of their interdependencies, and the relationships existing between the sub-systems. The ideal is thus to always ensure that the intervention planned be viewed in context of the three enabling components. Additional detail on each of the sub-systems follows.

Process architecture

This sub-system deals with the understanding and mapping of core and supporting processes within the organisation, that the core elements of the business are understood, and that the business coverage is contained within the process architecture, able to serve as a blueprint of how the organisation works (the flow of work), the triggers (actions which set off the beginning of a process – e.g. procurement of goods), business events, inputs and outputs of the process maps, etc.

Processes are vital in understanding how the business works, which parts create the most value, where the redundancies may exist, where inefficiencies may reside, where improvements of throughput can be accomodated. Having acces to such mapping, allow organisations to better relate to training issues, incentives, automation, technology support, etc.

People architecture

This sub-system deals with all human capital management issues, the skills required, the remuneration of the skills, the recruitment, the incentive models, the capability of the organisation to change, etc. The people component of the business is important, yet often underestimated, however its prominence has resurged, particularly as reflected in the growing trends such as “intellectual capital”, “human capital”, “knowledge economy”. People and their skills should thus be viewed as an equally important part of the tactical architecture.

Technology architecture

The technology sub-system is the third component within the tactical architecture; care must be taken not to view the technology architecture as information technology (IT) systems only, but rather as technological enablement, thus implying any form of technological aid (hardware, software, networks, electro-mechanical, etc.). These are the physical toolsets produced, to make our lives easier and more efficient (like a tractor, a micro-wave oven, a desktop application, a financial system, etc.). The deployment of technology is thus predominantly to gain efficiencies (manufacturing, calculating, documenting, collecting, presenting, manipulating, reporting, etc).

It represents a core element in all businesses today (be it on a rural farm – using a plough, or a stockbroker using web-based software to forecast price fluctuations for his clients). Keeping this in mind, technology does impact our lives in a fundamental manner, thus its presence in the tactical architecture.

The tactical architecture can thus be summarised as being a function of the process architecture, the people architecture and the technology architecture. Interms of the naming convention of the framework, this function can be captured as: “TA = f(PrA x PeA x TA)”.

Process Architecture

As mentioned, the Process architecture is primarily concerned with the manner in which the flow of work occurs within an organisation. In any business or organisation, components, products or information or a combination of these, must flow from one point to another, and at each point, stage or stop, usually some sort of value are added to it, before it moves to another stage within the operation, until the activity or product is complete. This is usually referred to as a “process” or “value-chain” or “workflow” sometimes these phrases are interchanged in their usage. For our purposes, we shall define process as follows: “A group of inter-dependent activities that jointly create a value proposition”

This definition of a process covers two key elements; a group of inter-related activities (be it people, technology or both), and the creation of a value proposition (be it creating value to an end-user, a client, a customer or an internal organisational stakeholder). This definition also underlies the model of systemic thinking and complexity in that it pre-supposes the interaction and inter-dependencies of a number of elements working toward and influencing an outcome. Before delving deeper into this sub-system, it may serve well to analyse the components of a typical process, in order to understand the detail, which will follow. Typically, a process is comprised of the following:

(i) Triggers

These are events that initiate or set in motion a single or range of processes or activities. A trigger could be an order received, an inquiry, a query, an instruction, etc. It is anything that is the source, or the reason for, the setting in motion of the processes or chain of activities. One process may thus have a number of different triggers (e.g. the purchasing department may be requested to buy additional inventory based upon production schedules (an anticipated spike in production); or marketing initiatives (by virtue of specific demand for promotional activities, etc.). Similarly, the engineering department may alert the purchasing department about breakdowns in equipment, resulting in an impact on inventory and production. The point is that there are a number of triggers for some events, other may only have one, depending upon the actual process being set in motion.

(ii) Building blocks

Building blocks refer to parts or patches of the business, and usually include a range of technological aspects supporting the business. In most instances, building blocks may be impacted from various processes and sub-processes, but are central in terms of how they assist the attainment of a number of business imperatives (e.g. the billing engine for Telecommunications companies; a robust data warehouse for banks; call centres for support; management of cash systems, etc.). Thus it is a group of activities, processes and infrastructure that is usually deployed to operate a function of the business.

(iii) Value chain

The value chains are the core end-to-end events, which deliver value to stakeholders. Value chains usually flow across the business, and represent the vital aspects of an integrated set of events (processes) that are essential in the delivery of desired outcomes (improving sales, enhancing effectiveness, customer acquisition, etc).

(iv) Sub-processes

Sub-processes make reference to supporting processes or processes that support a higher-level activity or process. Depending upon the core process, there may be multiple supporting or sub-processes.

(v) Business coverage

Business coverage or business event coverage refers to the extent of which the desired business outcome is covered within the process architecture. Ensuring that the business coverage is adequately accommodated within the process architecture will ensure that the probability of something going wrong is reduced or at least easily identifiable within the process architecture. It also provides a sense of the inter-relatedness of the processes and sub-processes in the event optimisation work is to be undertaken or implemented.

Process excellence holds a number of advantages in terms of its “fit” within the systemic thinking and complexity approach of the model. One advantages, is the concept of an integrated view, and secondly, it promotes continuous improvement as a distinct necessity (based upon many reasons but as an example, one cannot have a static view since the changes in technology and management techniques impact process). Thus irrespective how finely tuned a process may be, it remains imperative that continuous improvement be seen as integral element, whether such changes are implemented incrementally or aggressively. Only if this approach is accepted can an organisation be truly value-driven. Value, in this context being defined as, what a client cares for and is willing to pay for, i.e. being outcomes based.

Process transcends traditional functional compartmentalising as it involves tasks performed across several departments, it further enhances the view of an organisation as a complex adaptive system (CAS). Since process is outcomes based, an order to cash process starts with an order (say an example, for goods, products or services), and ends with a client paying (for the good, product or service), the invoicing is viewed only as part of the process as it is not identified as the outcome, but only a means to an end, the actual outcome being, cash in the bank. This is illustrated in the diagram below.

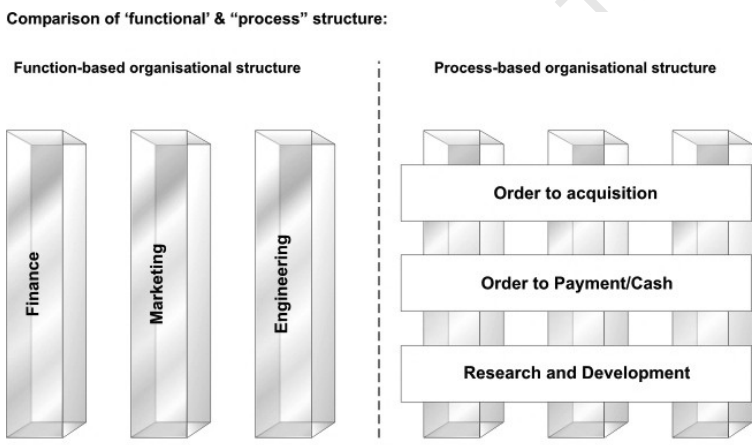

Figure D13: Function versus process structure, taken from the BAT software

Other important aspects of process architecture is, understanding and relating to the following ideas and principles.

Defining a process - a specific process and its related sub-processes starts by the identification of the desired business imperatives or business outcomes. Usually it is easier to work backward from this position (e.g. working backward from say an outcome of lowering costs, or increasing quality of product, etc). Performing this "reverse-engineering" ensures that the value chain is charted correctly by identifying the inputs, activities and outcomes, that provide the business coverage for the specific outcome.

Integration of processes and sub-processes – relating and grasping how processes fit together (process maps) is vital as all of them are inter-connected and thus have an impact on each other. This concept is important when tweaking or changing aspects of a process, without verifying the impact of the change across the system and its value chains (e.g. when ordering and procurement does not take into account stock levels or inventory, it may lead to poor service or bad business practice since it could force higher levels of stock and inventory).

Targeted interventions – since any organisation has limits to its resources, it becomes prudent to realise the importance of targeting core processes or process having high intrinsic value. Targeting the high value process chains is usually a priority since the best results can be attained in their refinement and optimisation (questions like which processes create biggest client value; which processes presents the biggest opportunity for improvement (low hanging fruit).

Innovation – one of the key reasons for mapping the core processes is to understand how they work and fit together in bringing forth the value to the stakeholders. In this exercise, it is important to always look for innovation in terms of ongoing refinement and enhancement of the process. This will aid in avoiding any duplication and bring forth considerations such as reconfiguration, reassignment, re-sequencing, relocating, retooling, etc in terms of enhancing and delivering continuous process innovation.

Trends and tools – this segment makes reference to trends and tools that impact processes and businesses in a fundamental manner. It indicates and underlines the broader inter-dependencies that exist across the various levels of resolution internally and externally to the process architecture. Typically, these may include the Internet, Wireless applications, Wide Area Networks, centralised or mainframe computing versus networked or thin client computing, shared databases, data warehousing, etc. All of these technological and management innovations impact on how organisations do business, and touch upon process architecture. Keeping abreast of such movements will ensure that the process architecture remains optimised and current within an innovation context. The diagram below represents this concept of how technology inspires process, and process in turn drives technology.

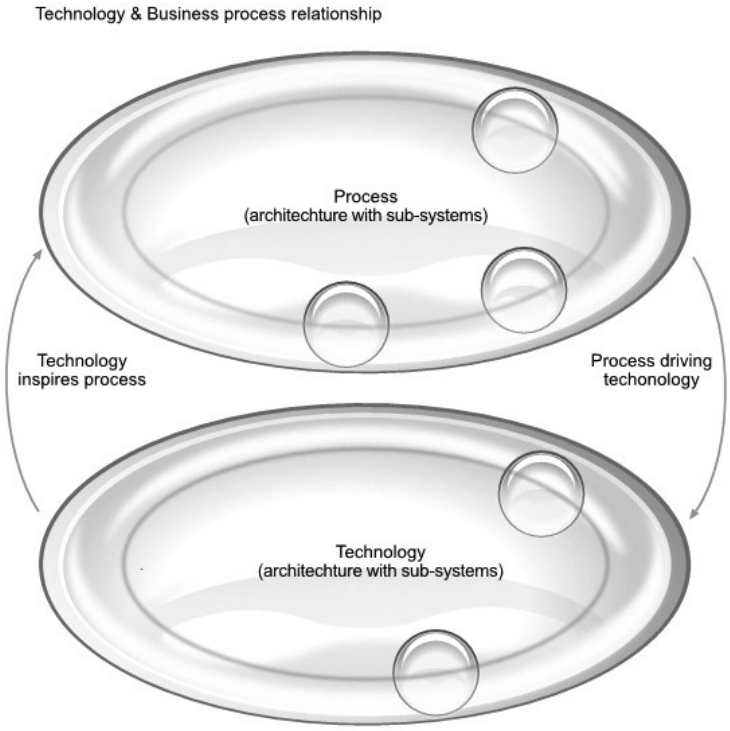

Figure D14: Technology and process relationship taken from the BAT software

The adaptation of the process architecture and process maps as espoused within the context of a viable system, ushers in change and innovation. The dynamic environment increasingly require the ability to change faster (adaptation), and is a foremost requirement for organisations to remain relevant. This implies that the process architecture must be informed by these changes and move fast enough (agility of an organisation) in order to remain sustainable. Understanding of these changes and the capacity to conceptualise the scale of change and the organisations ability to change becomes vital. The diagram below is a rough illustration of the scales of change and what it may imply in terms of its magnitude.

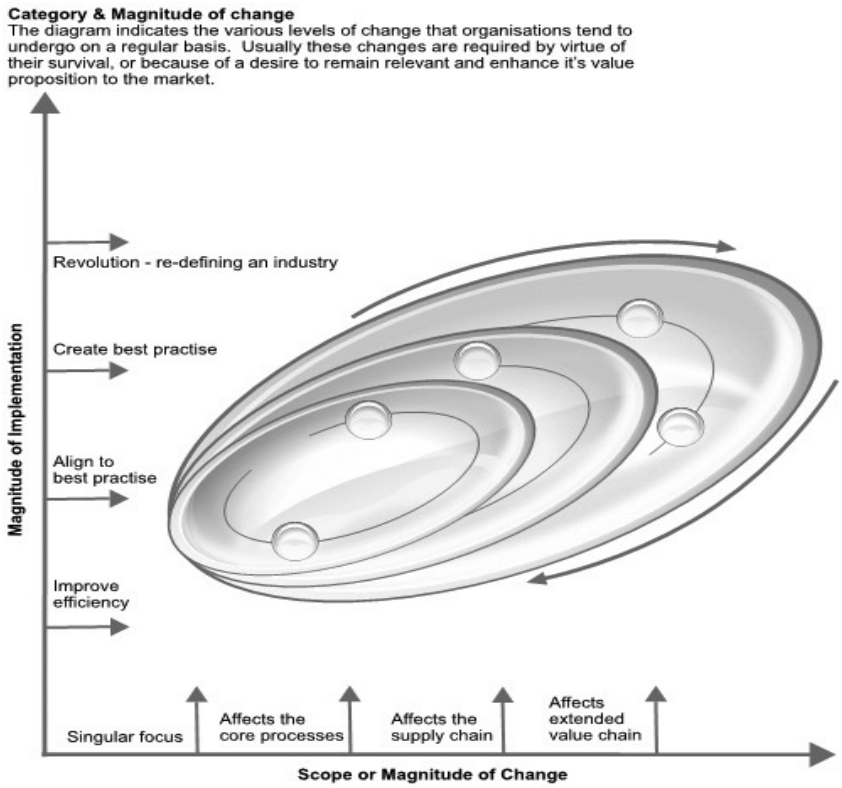

Figure D15: Category of change taken from the BAT software

The next phase of the process architecture is to highlight the key sub-systems that make up the process architecture. These are the essential elements in understanding any process and provide a framework within which to view and review the process architecture. The process architecture as promoted in the model comprises four core sub-systems, appearing at a lower level of resolution. These sub-systems will have supporting sub-systems at an even lower level of granularity. The four sub-systems of the process architecture is comprised of the following: Designing process maps; Enablement mapping; Model process & enablement interaction; Audit, testing & validation.

Process architecture is consequently a function of Designing process maps, Enablement mapping, Process and enablement interaction, and Audit, test validation. It can be expressed as: “Pra = f(DPM x EM x PEI x ATV)”. The appearance of the sub-system is shown below.

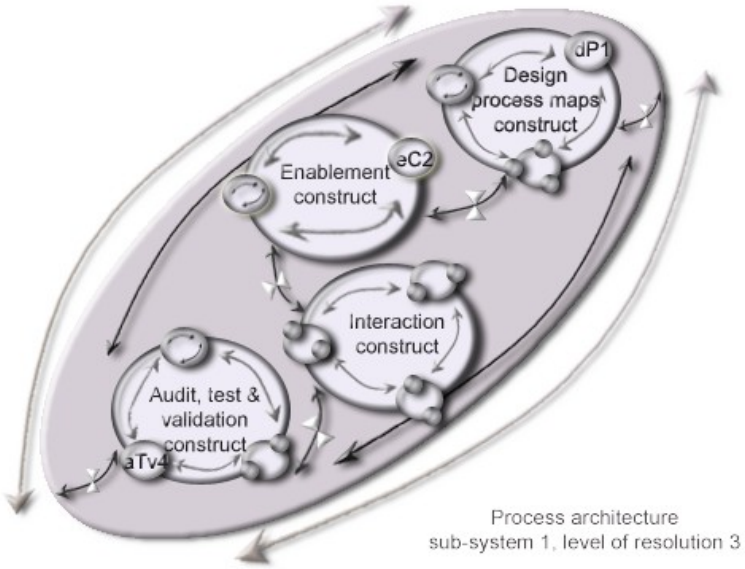

Figure D16: Process architecture taken from the BAT software

Designing Process Maps

This sub-system of the process architecture deals with the mapping or charting of the flows of work and information in the organisation. Plotting the movement of information and work allows management the opportunity to view the organisation in terms of a high level map and have a type of blueprint snapshot. This exercise typically starts by understanding and charting the flows of the primary or core activities within the organisation. These activities may later be broken down into sub-activities in order to understand the detail process flows within the core processes.

The function of this “reduction” is for analytical purposes in order to exhaust the understanding of the broader impact of the functioning of the bigger activities, and also provides a sense of the integration. It is also during this stage where triggers, inputs and outputs are noted and defined. Another key aspect in this stage is the definition and identification of the tasks and activities, which must be undertaken to achieve the desired final outcome.

During this part of the process architecture we also determine the hierarchy of processes, identify the most complex, most value creating and simplest processes. This allows the verification and audit of how well the process maps does actually cover the business capability. From this point, we are then able to validate the process flows and the high-level process map. The core sub-systems of this construct is thus comprised of the following:

Prepare high-level process maps; Analysis and Reduction of core process maps; Map hierarchy of process maps and supporting processes; Audit process maps against the required business coverage; Validation of process flows and maps.

In terms of the model representation, Designing Process Maps would be a function of preparing high level process maps, Analysis of core process maps, Hierachy of processes, Audit of business coverage and validation. In summarised form this would appear as: “DPM = f(HPM x ACP x HP x ABC x VC)”. The diagram illustrates the supporting sub-structures of the integrated model.

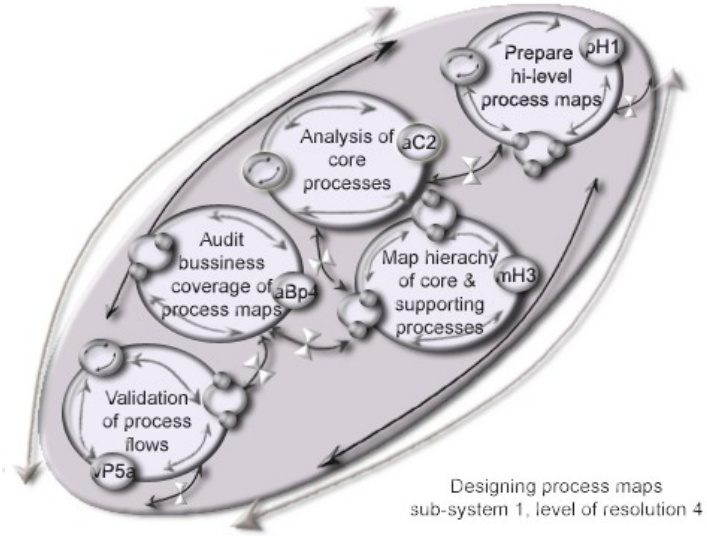

Figure D17: Designing process maps taken from the BAT software

As can be seen from the structure at this level of granularity, the components of the specific sub-system (design process maps), cannot be viewed in isolation as the very nature of the exercise dictates having a systemic perspective since the activities “inform” and impact each other across entire

sets of value chains. The following is more detail within each of the supporting activities contained within the process-mapping sub-system.

Preparing high level process maps (core activities)

This sub-component deals with the processes that represent the core of the business or organisation and usually are the ones that are most obvious and viewed as the vital activities of the organisation (depending upon the type of organisation this can range from raw material or input material in a production environment; to say R&D for a technology company or an organisation that deals in intellectual property). Whilst there exist variations in the number of core processes that should be represented in this exercise, this must not be viewed as a "limit", but rather as the core activities that make up the overall base activities of the organisation. The logic for this approach is to have the large building block activities noted. Each of them would usually comprise a number of sub-processes when delving deeper into the composition of the core processes. Consequently high-level process architecture should contain approximately 12 core processes. These will predominantly be quite abstract but be broken down into supporting processes at a later stage of the model (typically one such core process may be "orders received" – it does not go into the detail of whether these are "over-the–counter, via the company website, via sales people deployed on the ground, via word-of-mouth, etc), this detail will be attended to at a lower level of resolution where each of the supporting processes are mapped and understood in terms of how they fit into

the core process. Process mapping or process modeling has a similar approach at any given level of resolution, illustrated by the diagram below.

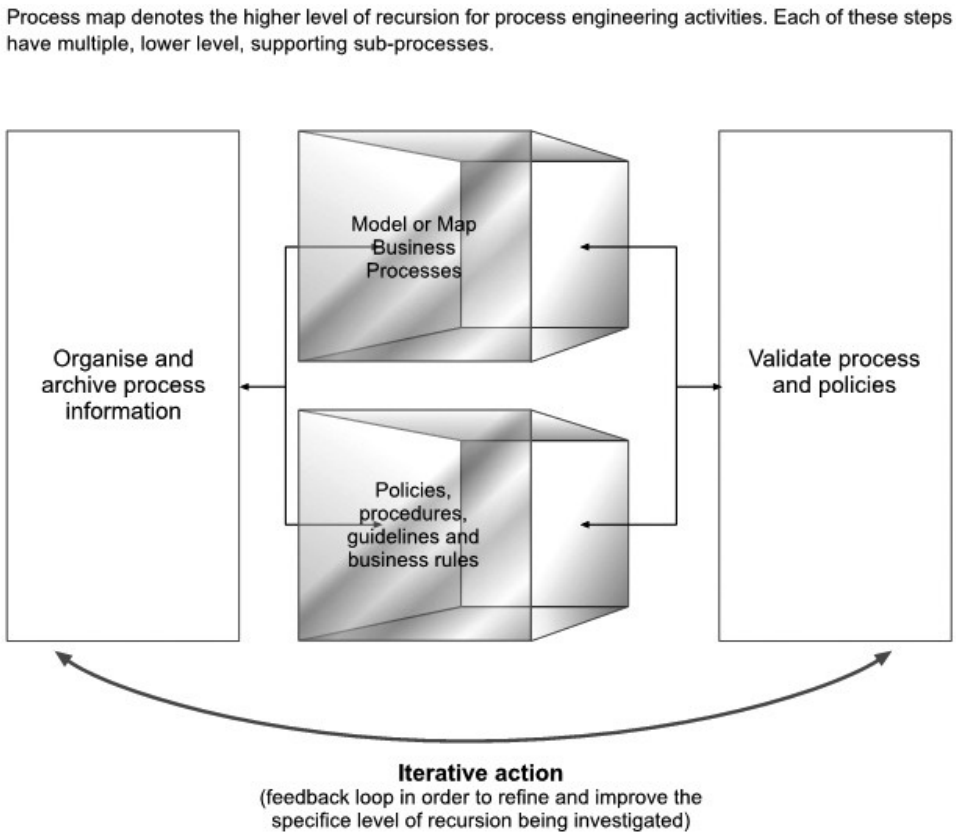

Figure D18: Process mapping iteration taken from the BAT software

Organising and maintaining process information

This segment of the model is vital since it helps to track changes due to say improvements in staff, core competences, better and faster machinery, etc – all the factors which make business improvement so dynamic. Consequently, having these mapped and captured in an appropriate modeling tool will allow the business to keep track of changes and enhancements by adapting the blueprint processes accordingly.

Model or map business processes

This segment deals with creating and mapping end-to-end process models, which must contain all the elements within the process (departments, inputs, outputs, workflow, etc), and is usually where the use of a robust modeling tool becomes important since it eases the design matters and standardises on the codes and labels being used in the maps and process models.

Policies, procedures and business rules

This area is equally important as it concerns itself with matters of governance of the organisation in terms of its own policies, the law, procedures, guidelines and business rules which are deemed acceptable and good business practice. This activity is usually a parallel one to that of the mapping exercise.

Validate Policies and processes

This segment of the model validates and benchmarks the overall process map or process model with the organisational policies, guidelines and procedures governing the daily operations of the business. Usually it is good to validate this against specific criteria which could include completeness; transparency, auditability, accuracy, etc.

Enablement mapping

This section of the process architecture deals with the various “tools” required to enable the functioning of the process architecture, i.e. the things that will make the process work (people, hardware, software, office space, etc). These are the toolsets, which give support and enablement to the execution and completion of the processes in the organisation. In terms of our model, this sub-system would reside within the process architecture map, having its own lower level of resolution. The detail of this subs-system indicates that the Enablement Mapping is a function of Map interface of tools, Map HR interface, Dependency and constraints assessment, and the Delivery of the interaction model. In the models abbreviated version this would appear as “EM = f (MIT x MHI x DCA x DIA), and would appear as indicated below.

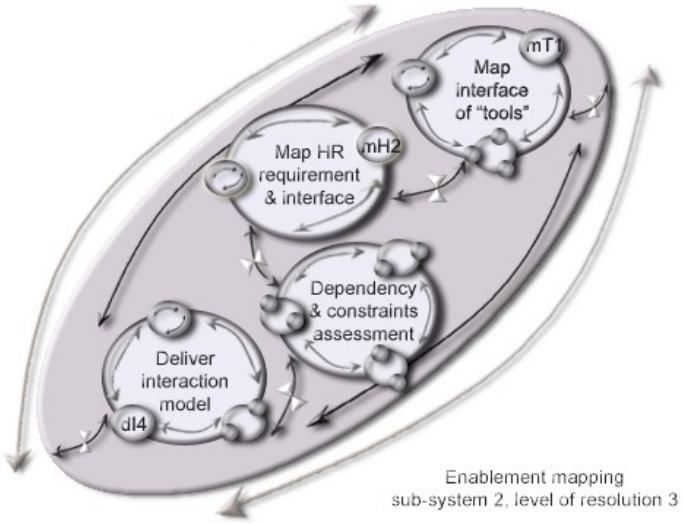

Figure D19: Enablement mapping taken from the BAT software

As can be seen, contained within the enablement-mapping construct, reside four sub-systems, featured at yet a lower level of resolution. As with the previous supporting sub-systems, the enablement level of resolution represents the core "resources" required to provide impetus in the execution of the processes in its most fundamental manner. Care must be taken to realise that, in terms of the model being promoted, these sub-systems all interact and influence each other, which provides for the delivery of the expected output. The following represents a bit more detail under each of the components of this level of resolution.

Map interface with tools

This segment of the architecture deals with the tools we surround ourselves with, in the daily operations of the business and include enabling tools such as: The physical environment; The hardware requirements; The software requirements.

Physical environment

In terms of the environment, i.e. the physical office space, its location, its neatness and propensity to foster a favorable working environment, safety concerns, etc, it must be seen as an integral part of creating the value that is envisaged from the processes. The contribution to the emergent qualities cannot be denied in terms of ones physical environment; clean, safe and "output-friendly" working conditions ensures that the individuals working within the space undertake tasks with the required seriousness and dedication. Having sloppy or dangerous working conditions cannot be seen as being caring and supporting from the organisation. Mapping these types of requirements also obviates potential legal matters in terms of health and safety. Furthermore, ergonomic considerations are often a requirement that should be incorporated into the design and layout of the physical environment (this may be important in terms of repetitive actions and actions which require a high degree of physical concentration and interaction).

Hardware requirement

In terms of hardware (this could include machinery, presses, printers, rollers, network infrastructure, desktops, laptops, etc); these too may impact the facilities layout, e.g. a large safe and secure room to house the mainframe computer, or ensuring sufficient space is available for big machinery and related production line considerations.

Software requirement

Organisations have various software requirements (these could be for the desktops, network protocols, security, financial applications, scada systems, database, portals, etc). In terms of the software considerations, matter such as licensing fees, legal and latest versions must be kept safe and available in event of an audit or emergency "re-load".

Ensuring that the interaction between the human resources and these tools are mapped and clearly understood, will result in the desired interaction model of the operation, understanding their synergistic interaction creates the ability to continuously tweak and enhance the overall process. Since the interaction between the human resources and the tools are pivotal, it must be appreciated that the interfaces with the various technologies in itself require mapping to understand the relationships between the enablement types (hardware, software, people). Understanding how this interaction plays itself out gives rise to the requisite understanding of fine-tuning the process and ironing out problems of support and toolset interface.

Mapping the human resource requirement interface

Most, if not all businesses require human intervention, granted the more technologically advanced, the lesser the human interaction. Consequently, in order to maximise the value creation and extract full benefit from any process, having the human interaction defined and mapped represents an important aspect. The manner in which this is done has been to scope the requirements from the process in terms of the detailed action that would be required by the human resource component, thus the supporting sub-systems resident under this area would ideally be comprised of: Review of the critical tasks in the process; Identify the skill set required; Identify the roles and responsibilities (key reporting areas & key performance indicators).

The approach at this level of resolution is to scope the actual output required (the job description) with the requisite skill set needed to effectively deliver on the output expected. It also allows for the identification of roles and responsibilities to eliminate confusion and boundary issues within the operational landscape. The following detail description under each of the supporting sub-systems provides a good overview.

Review critical tasks

This sub-process details the critical tasks contained within the process, in order for the output to be realised. This segment de-composes the major processes into core activities, which in turn would be comprised of a number of tasks. These are the daily routine functions that are required to deliver on a higher level of resolution (e.g. retain a copy of the invoice within the procurement cycle is one of many tasks within the core processes model of procurement). Each of the core processes are thus de-composed in this manner, to arrive at the tasks that need to be performed in order to make the bigger process a success. The following is a schematic of the de-composition of a typical process into its supporting tasks.

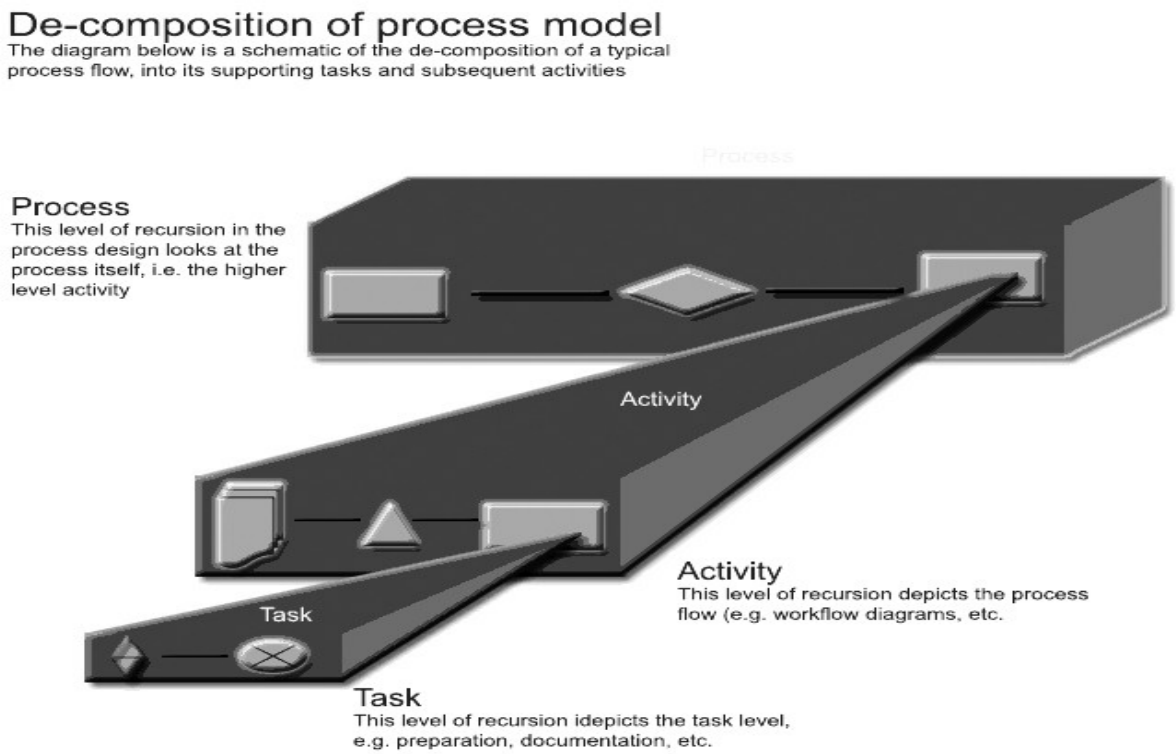

Figure D20: Decomposition of a process model taken from the BAT software

Identify the skill set required

This activity takes into account what skill is actually required to execute the function effectively. The attempt is to ensure that the scoping of the actual skill needed to execute the required function (e.g. administration, supply chain management, computer programmer, plant operator, driver, etc.), is executed effectively. Care should be exercised when mapping and identifying the appropriate skill base so as to allow for future enhancements and changes (it may be feasible to have human resources on hand that has the propensity for multi-skill). This stage requires the identification of skill type and not the actual human resource skill. The human resource will be handled within the human resource architecture aspect of this model. The skill set being mapped out must be done in a manner to ensure that the business capability remain supported at all times. The inter-relatedness of the model, suggest the task analysis function performed prior to this segment, informs the required skill levels which are to be deployed; the more detailed this activity, the better since it feeds into detailed job designs, job descriptions, competencies and roles required. Another key aspect is the behavioral aspect that is usually tied very closely to this process (culture is partly influenced by the process itself, as well as the organisational culture prevalent).

Identify roles and responsibilities

Identification of the various roles and responsibilities within the process is important since it provides clarity to all the stakeholders within the process as to, when, why and how, they are expected to perform. This task is often under-estimated leaving gaps within the process whereby “gray-areas” allow for things to go wrong since handover within the process has not been articulated and documented appropriately, resulting in sub-optimal performance from components within the process. This may lead to degeneration of the process particularly if there is a great deal of inter-dependence, or when the “gray-area” happens to be a core sub-process or activity. From this deliverable, it becomes much easier to verify the key reporting areas (KRA’s), as well as their respective constituents, i.e. key performance indicators (KPI’s). The identification of roles and responsibilities therefore yields the foundations of the management barometer of the process. Additionally having a comprehensive and detailed description of roles and responsibilities with their resultant key reporting areas and key performance indicators assist the organisation in recruitment, selection, and training needs, since the job profiles have been specified and clearly communicated.

Dependency and constraint assessment

This sub-system of the process architecture ensures dependencies are understood, noted and mapped in order to understand the implications across the business, and being aware of any constraints within the processes regarding bottlenecks and potential problem areas to be resolved (often tweaking one aspect of a process results in a less-than-optimal domino effect on another activity within the process value chain), thus knowing the constraints provides for pro-active responses and mitigation. Care must be taken to view impacts from a business policy level all the way through operational zones in order to clearly assess the dependencies and constraints that the process may encounter, ideally covering the following: Map policies; Map user characteristics; Map performance requirements;

This equips the organisation to be alert in terms of conflicting events and tasks, which may arise in complex process flows. The exercise gives meaning to the actual business performance model, which in turn influences business policies, its subsequent business practices, which impact the business procedures and eventually translates into business rules of the organisation. Consideration to the following aspects are important when mapping policies, user characteristics, and performance requirements.

Business performance model – the qualitative model of the business capability defines important parameters such as: performance measures, targets, management and related reports, etc. This model translates the business case into strategic performance and objective criteria that drive the delivery phase, thus bringing forth the "value" promised in the business case.

Business policies – these policies refer to the operating guidelines for conducting the business in an equitable and transparent manner. By definition policies therefore usually impacts on a multitude of processes, which in turn impacts on a number of business procedures (which is a more refined interpretation of the policies).

Business practices – ideally these practices are impacted by the policies as well as human and technological support. The business practices refer to sets of integrated approaches of applying the enablement (people and technology), within the defined parameters (policies), in order to achieve an outcome. This definition also explains why good business practices usually are referred to as innovation (e.g. web-based procurement).

Business Procedures – the business procedures refer to the physical flow of work from beginning to end of the value chain, which explicitly obeys all the required business rules. Thus by definition the business procedures also yield options and possible alternatives and exceptions throughout the workflow process.

Business rules – these are combinations of and groupings of actions, logic, terms and conditions required to complete a predefined output.

Interaction model

This sub-system relates to the capacity designed or implied i.e. people, the tools (physical environment, hardware and software), and testing the emergent capability, which is to deliver the value to the business. This model gives rise to how the various components interact with each other and allow for the adjustment and fine-tuning of the business processes. Core steps within this level of resolution are: Interaction definition; Adjustment; Delivery of the model.

Since the interaction model provides understanding of how the elements of the business capability inter-operate to achieve and deliver upon the business performance model, it remains an iterative approach (feedback loops) to ensure the system remain viable and relevant in terms of providing the expected business value. A core consideration is to realise that the interaction models are ideally informed by the process and workflow. To ensure continuous adjustment based upon the feedback loops, updating the business performance model after adjusting the interaction model is important since the key reporting areas and key performance indicators may be affected as well. Another aspect is to remember that the interaction model must contain the skills requirement, the information requirement as well as the support requirement (hardware, software, etc). The diagram below depicts the interaction model.

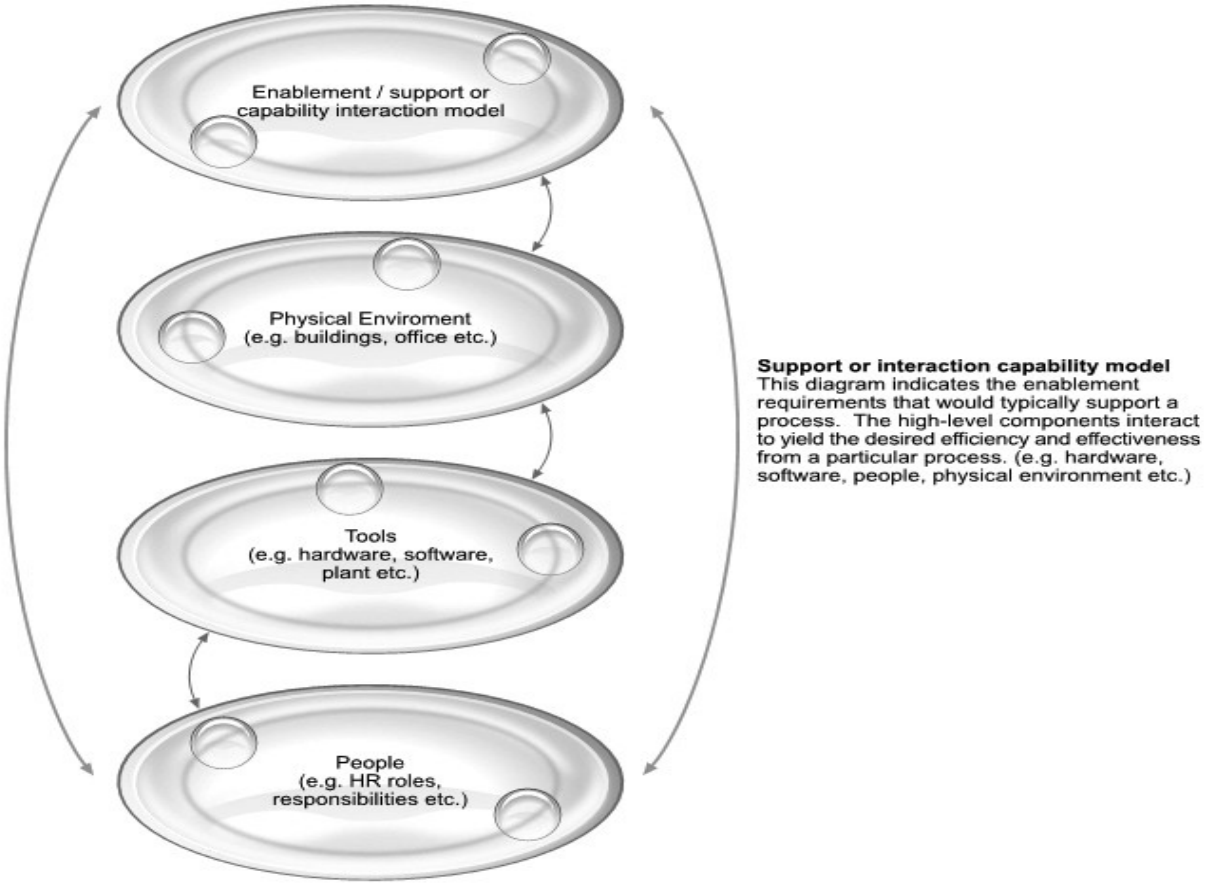

Figure D21: Interaction capability modelling taken from the BAT software

Model interaction (process enablement interaction)

This sub-system of the process architecture deals with all the components within a process, and plotting the model interaction. It contains lower levels of resolution comprising the core modeling of the process interaction. The Model Interaction is thus a function of Understand and map business interaction capability, Creating an interaction model, and Refining process maps and flows. This is expressed in the form of " MI = f (UMBI x CIM x RPM). The diagram below depicts this view.

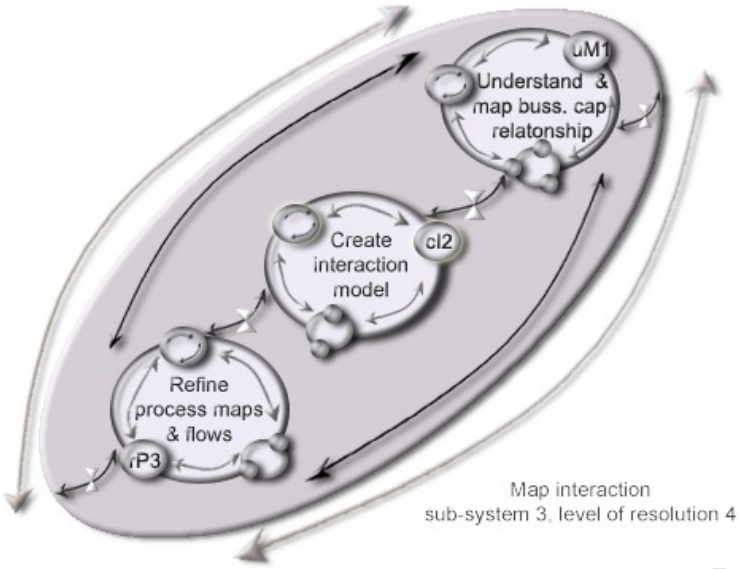

Figure D22: Mapping interaction taken from the BAT software

As can be seen from the diagram, key components of this construct are: Understand & map the business capability relationship; Create the interaction model; Refinement of process flows and process maps.

This sub-system requires understanding of the business, and the requirements of its current capability, and the relationship between these two constraints, e.g. assume the nature of the business requires say at least one engineer and one finance expert, and knowing that the current capability falls short in one of these two competencies. This implies that the shortcoming must be addressed in order to have a match between the business and the capability; the same would apply for say when the capability requirement calls for high-end technological support, etc, then such enablement must be planned for to ensure minimal capability is always resident in the organisation.

Understand and map the business capability

The first step under this activity would be the confirmation of the defined business capability since this really informs the operational business model to be applied, as well as the strategy adopted to best achieve the goals within the given parameters. Most of this information would be obtained from previous levels of resolution (such as strategic construct, etc) since the scope of the business architecture would yield the high level requirements of the actual business model in terms of the depth and width of support required. This activity reconfirms all of the "ingredients" and allows for the mapping of the business as a whole. Some of the steps within this activity would include:

Business description

This is a detailed description containing the overall purpose of the organisation, its limits and boundaries, etc. This sets the tone to be able to know with a high degree of confidence, what the organisation does, and hence, what it would require, to make it a reality.

The value proposition

An account of what exactly that the organisation would be offering the environment (the market), what value does it create that the market is willing to purchase. This activity ensures that the end product or service does indeed have the required business coverage to deliver the promised value proposition it makes to the market.

Constraints

By ensuring that all constraints are understood and in some form, accommodated for, allows the organisation to be prepared and alert to sensitive areas of the business. This segment of the resolution looks at all constraints.

Business policies & practices

The business policies adopted, and its resulting impact on workflow and daily practices are obvious, thus incorporating this into the business capability allows us to view the organisation as a whole, with the “rules” regulating the system, giving rise to the organisation as a complex adaptive system (CAS).

Generate and create interaction model

The interaction model refers to having a map capable of providing different views of the business. This allows for the observation and verification of the business performance from various positions (e.g. viewing the business from a technology perspective, or viewing it from a “people” perspective). These different views are then grouped to yield an integrated map of the business capability. The swim-lane model is one possible way of achieving this. This approach takes the different views and categorises them into silos or lanes (hence the name swim-lane diagrams). There are many ways to represent the interaction model, depending upon the tools used for analysis and modeling.

The model also provides insight as to options of in-source, co-source, out-source, etc, based upon the interaction map being created. It also gives a snapshot of shared or pooled resources per activity (skills, location, equipment, etc).

Refine process maps and process flows

This activity looks at testing the business capability, with the express purpose of improving and refining what has been put in place. Thus optimisation of the workflow and related process maps are updated in this segment. Some of the key techniques used for this exercise are: Cost Benefit Analysis (which looks more to the financial viability of the solution); Value Chain Analysis (verifies the components of the value chain in the process flows); Impact Analysis (technique that helps to look at the impact of change on the organisation); SWOT (analysis of the Strengths, Weaknesses, Opportunities and Threats of the organisation). A core planning consideration in this segment is to benchmark and incorporate innovations (e.g. by searching and creating best-practice models). Another major planning consideration within this level of resolution is to undertake the activity, as an iterative approach, allowing for continuous adaptation and tweaking of the workflow.

Additionally, it may be important to use cross-functional expertise in this activity since any changes being adopted or promoted impacts the entire system, and therefore requires careful thought and analysis regarding the impact of the changes.

Audit, test & validation construct

This sub-system of the process architecture deals with the audit and validation of all the components within the process flows (people, tools, actual workflow, etc), and provide a holistic picture of the business. It is here that the business is audited and validated against the desired output, i.e. is the business providing sufficient coverage to perform and deliver the envisaged output.

This activity requires the setting of audit parameters, capable of testing and validating the system as a whole. Core consideration contained within this sub-system includes matters such as, Security issues (is the intellectual property protected); Total business coverage (does the process and workflows provide end-to-end cover); Skills (are the requisite skills in place); Tools (does the current hardware, software, environment impinge productivity); Overlaps (making notes of overlaps in terms of risks, legal issues, etc).

At a lower level of resolution, there are a few key supporting sub-systems contained within the audit, test and validation construct, these are: Prepare and conduct audit & validation; Review; Refine. In terms of the model this can be represented as: “ATV = f (PCAV x Rev x Ref). This is depicted in the diagram below.

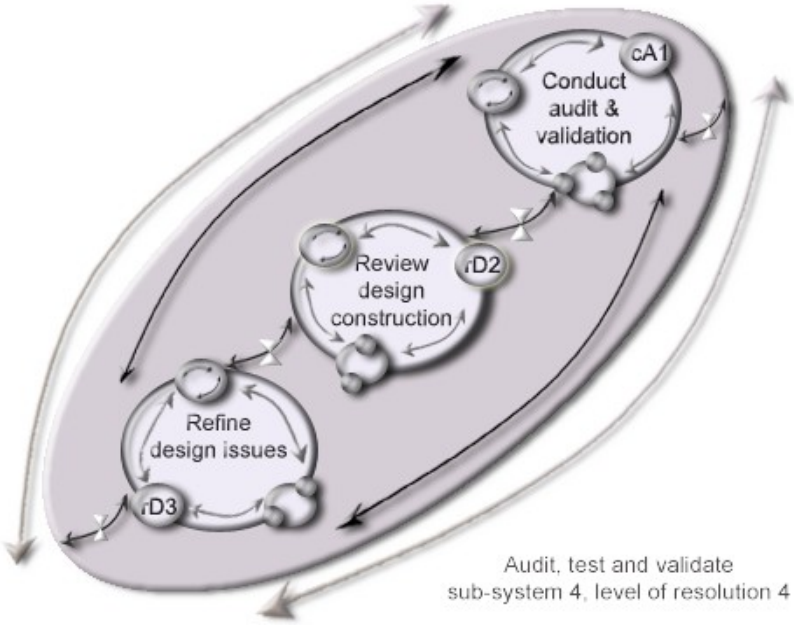

Figure D23: Audit, test & validate construct taken from the BAT software

Detail of each of the sub-components at this level of resolution would typically include the following:

Prepare and conduct audit and validation

Since testing the process is the key objective at this level, this activity ensure that this test occurs in a planned and well coordinated context, which in turn will provide real intelligence on where the systems works and does not work effectively. It is therefore imperative that the audit be carefully planned and executed to ensure proper measurement and data collection. Typically, in preparing for the audit and validation, the following elements should feature as a minimum: Designing the test approach; Planning of the test; The actual execution of the test run; Interpretation of the test; Collection, review and tabling of the data.

Having this or a similar structure to the audit process will limit errors in testing parameters, since recommendations will be made based upon the results. The test approach can be divided into models or stages for ease of review, each having its own detail regarding test objectives (e.g. what will be tested, specification of quality, time, etc); test metrics (defining what metrics to be used, how to interpret the results, etc).

Review segment

This sub-system of the audit and review construct deals with the review and interpretation of the data of the preceding activity. If all the set parameters of measuring and testing are adhered to, this segments outputs are made easier and requires review and interpretation of data with the resultant recommendations.

This activity will therefore highlight issues or problem areas in terms of the agreed and accepted test and audit measures, the output from this activity is therefore a comprehensive document articulating what is good (what works), and what requires more attention (what is lacking), and other potential risk and bottleneck areas. These comments will all be in context of the business capability components (people, tools like hardware, software, environment, process). Should the review suggest any changes, these are then effected and the process of review is again undertaken to verify its intended effects and consequences. Implementing the suggested changes in terms of the review segment is performed and executed in the “refine design issues” sub-component of this level of resolution.

Refine design issues

This segment is where the review recommendations are implemented. It deals with what will be fixed, why it needs fixing, the implications of the intervention, and ensures that all related documents and process flows are updated accordingly. This segment therefore requires firm control over design releases, version controls, variation controls and all forms of amendments to the business. The “blue-print” of the business or workflows are thus ensured to remain current and up-to-date should this function be executed properly.

People architecture

The people architecture is the second sub-system contained within the higher-level system of the tactical architecture, and concerned with providing insight into the people aspect of the business. The people aspect, is quite unique in its complexity, since it deals with emotional responses, higher-level consciousness, etc. The people architecture therefore deals with how best organisations should view people, and more importantly, accommodate for them in the overall business architecture.

The manner in which this sub-system of the tactical architecture has been formulated is based upon the very notion of the uniqueness of human beings, the ability to think and create (buildings, bridges, planes, trains, etc). Understanding human beings and the manner in which we think and behave have always intrigued scientists and philosophers. While we have learned a great deal regarding our own needs, desires and patterns of behaviour, many mysteries still remain. Much has been written to expand the understanding of human behaviour and its emergent qualities of consciousness. This sub-component of the tactical architecture does not intend to present such a level of explicit detail, instead, this sub-system is promoted merely as framework that can be used, in order to better relate and understand how people's various talents can be harnessed in meeting multiple objectives.

The people architecture has been designed to capture the essence of the needs of people in context of the larger systems they operate within, and often create themselves. The people architecture is comprised of three supporting sub-systems. The core of the proposition is largely based upon the work of Maslow's "Hierarchy of needs" but taken in context of a complexity reference. To this end, the proposed people architecture, contain three sub-systems, which are: Basic needs construct; Social needs construct; Abstract needs construct.

These supporting sub-systems contain basic elements people, require and need in general. Understanding each of these and developing unique responses to each of them may allow organisations to create true wisdom-based people interaction. Building a developmental and enriching environment will yield positive returns, across the various systems such people engage (be it at home, at play, at work). Understanding how we think, behave and interact enhance our knowledge of how we can improve our actions, in the workspace and other systems. This version of the people perspective focuses in understanding the needs and values inherent in people, putting these into a framework that allow us to view the people architecture (people sub-system) in a manner that benefit their interaction with other systems. In terms of the model notation, the People architecture is thus a function of Basic needs, Social need and Abstract needs, appearing, in the abbreviated function as: "PeA = f (BN x SN x AN)".

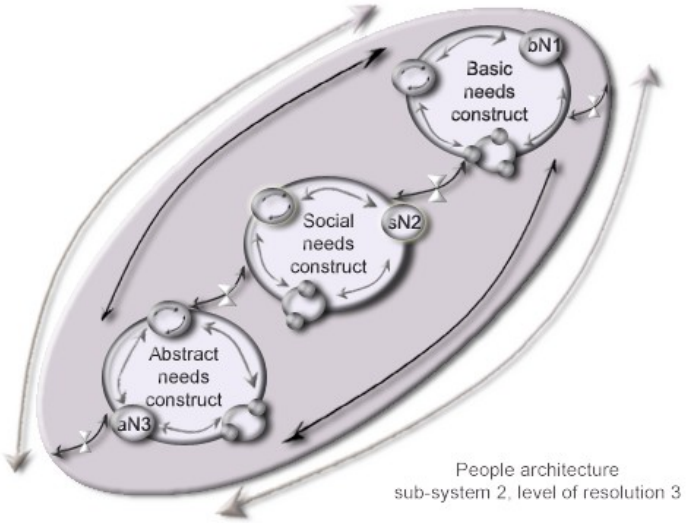

Figure D24: People architecture taken from the BAT software

A deeper view of the sub-systems comprising the people architecture follows, it must be noted that these constructs, as in the previous levels of resolution and the those following hereafter, are all based upon vital architectural constructs deemed important at each layer of resolution. The manners in which each of these are dealt with cannot be articulated in detail as the application of these would be subject specific (organisation or problem specific), the concept architecture acting as a proposed systemic map. The various architectural constructs promoted in the business architecture tool attempt to show and highlight inter-relationships and inter-connectedness of vital aspects we are confronted with.

Basic needs construct

This level of the human needs "system" constitutes very much the basic elements or properties of life, emergent phenomenon be it for plant or animal,

hence the naming convention of the construct “basic”. Typically the sensations, emotions and feelings that are associated with this sub-system of the people architecture include, among others, the ability to breathe, to eat, to drink, to grow (physically), to be healthy, etc, all emergent properties of life itself.

This sub-system can be equated to the two lower levels of Maslow’s “hierarchy of needs” – i.e. physiological needs and safety needs, comprising the basic needs sub-system. In terms of the people, we relate this need to have some sort of income, in order to source, buy or procure basic needs. The question we usually tend to face here is how much is basic need, does shelter imply a simple structure that is sufficient to protect us from the elements, or does it make reference to a three bed-roomed home. This question of what constitutes basic, can be debated for a long time, without any real consensus, however the point in this instance is simple.

People need some sort of income be it via working for an organisation, or trading or bartering, in order to sustain themselves and in the process, provide for their basic needs. The shape and form of the way we obtain the sustenance could thus be any of a varied form.

The end result is that we expend effort in order for us to provide coverage for this basic needs construct. If we take this in context of the corporate or business world, it is logical to relate remuneration or the “pay-package” we

offer people, as the basis of their effort in pursuit of ensuring that this base need is sufficiently accommodated.

The shape, size and format of the remuneration portfolio is thus most important in terms of providing coverage for people's base construct. The following is one possible view on such a construct, which have a built-in design ability to accommodate variety to suit various conditions. Typically, the remuneration level resolution of the basic needs construct would, at least be comprised of three supporting sub-systems, i.e. Basic Salary, Bonuses and Incentives.

The Basic needs construct is thus a function of Basic salary, Bonus schemes, and Incentive schemes, and can thus be reflected in short form as: “BNC = f (BaS x BoS x IS). The diagram below depicts the model appearance of this sub-system.

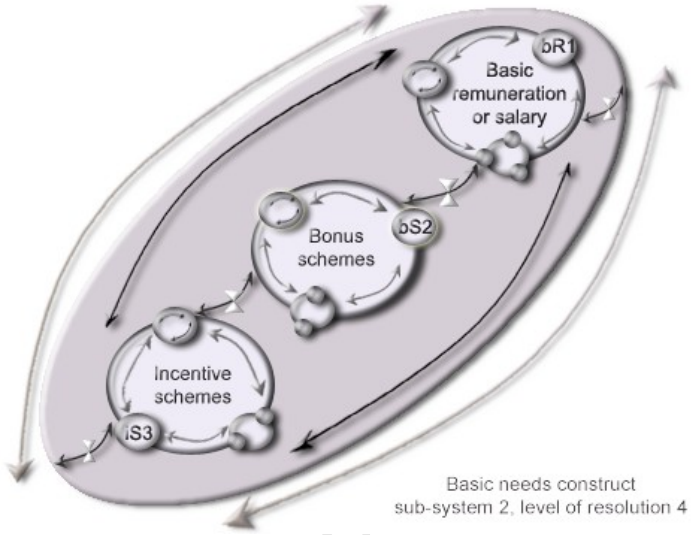

Figure D25: Basic needs construct taken from the BAT software

Some of the key aspects to consider within each of these sub-systems follow hereunder:

Basic salary or remuneration

This sub-system refers to the basic income people receive for the toil they undertake over a specific period of time. The general stance taken today is that of a monthly period with remuneration being calculated in various ways for the period in question. The nature of the salary package is dependant upon a number of issues such as the organisation itself, the sector in which they operate, the scarcity of the expertise required (market sentiments), the actual niche and vertical market the person will be expected to work within, etc. Additionally, the employment provider may have additional requirements such as specific expertise, qualifications and capabilities for the function they expect the individual to perform.

The salary package in turn would be impacted by such constraints and would generally result in an adjustment upward or downward depending upon the package of constraints used in the evaluation of the individual against the specific function (e.g. a salesman may require greater capability in the softer skills of negotiation and marketing, as apposed to say an engineering focused job may require).

Some organisations believe that paying a very high basic wage will ensure loyalty to the organisation and provide optimal performance regarding the job specifications. This mindset can prove to be dangerous and can result in losses in various ways to the organisation.

The key aspect to remember is that whilst a basic salary is important in providing the required means to attend to the basic needs of a person, it is not the only aspect that informs the people architecture, other concerns as per this model, may include social needs, and the more abstract needs discussed later. The basic salary is one of the components but should be viewed in context of the people architecture level of resolution.

Bonus schemes

The second sub-segment of the basic needs construct refers to the additional forms of remuneration that also contributes to ensuring a more inclusive type of salary package. There are various forms of expression regarding bonuses. Again, depending upon organisational specific policies and practices, industry demands, etc – all of which informs the type of bonus schemes deployed in ensuring that individuals are rewarded commensurately for their efforts.

The purpose of having the bonus segment as part of the remuneration portfolio relates to its common use as a tool, to reward individual performance in terms of exceeding or meeting specified and mandated parameters. Thid supporting sub-system relates to having mechanisms in place to motivate individuals to perform better at the workplace. The central feature here is that of being equitable and transparent. The real purpose of the bonus schemes, whatever the guise, be it called a “thirteenth cheque”, an annual bonus, etc, is to bring forth additional reward mechanisms for individuals who have been deemed to perform well in their specified roles, i.e. an additional “tool” of remuneration, designed to show appreciation and reward for the performance.

Incentive schemes

The third sub-system of the basic needs construct refers to yet another additive to the overall architecture of remuneration. The incentives are generally reserved for people that have been identified as being important to the organisation for whatever reason (marketing, technical expertise, leadership, innovation, etc). The options contained within this segment is equally varied as with the preceding sub-system, some of the more popular variants include share options in various share classes, promotions, performance bonus (usually an agreed percentage of either saving, cost reductions or sales, etc). The importance, as before is to ensure that the mechanism is designed to retain specific individuals in the organisation. Because of this, it becomes clear that equity and transparency again features as core in designing the actual incentive schemes.

The second sub-system contained within the people architecture refers to the Social and Interpersonal needs of people.

Social and Interpersonal construct

The second sub-system within the people architecture relates to the social and interpersonal needs. This level of resolution constitute the emotional needs which are found in middle and higher animals. These are the actions, emotions and occurrences that reflect a concern about communal or social matters, and tend to be those issues that are usually associated with the issue of “emergence” of the mind. It is about the concern of the future, communication, and a sense of belonging.

These values and needs are closely related to the basic needs in that there is a strong relationship in terms of remuneration and the social construct (most people tend to believe that their social standing is improved based upon the levels of income they are able to obtain – buying fancier homes, cars, clothes - i.e. the material possessions providing a better social status). However flawed this logic may be, most of us inadvertently in varying degrees, subscribe to such sentiments.

Being able to play, or to experience pleasure, form part of this level of resolution. Mostly we have a tendency to equate having “money”, in order to fully experience play and pleasure (buying a fancy island holiday, jet-ski, surfboard, etc all require money – hence the strong tie to the remuneration level of resolution). The question here is not whether this mindset is right or wrong; from a philosophical standpoint this argument is considered weak in that materialism inherently is indicative of a mental constitution that has been ingrained with the wrong values? Having said this, we are still faced with this dilemma, and an argument in terms of right or wrong becomes invalid since the reality is that it truly exist and consequently must be dealt with in terms of the systemic impact it has on people and the things that they do.

In the work environment, people tend to use their office status (such as having a large or fancy office, a state-of-the-art laptop, being a senior manager or a respected subject area expert) as “proof” of their social standing. Being deemed a successful manager, businessman, etc is often used by piers and parents as examples of success.

Although there seem to be a trend away from this ingrained and outmoded thinking, it will still very much be with us in the foreseeable future. These factors correspond to Maslow’s middle two levels in terms of his "Hierarchy of Needs", (Love, Affection and Belongingness Needs, as well as the Esteem Needs aspect).

Thus knowing the importance of the value the workplace has on this construct, it becomes important for us to treat it with the required care and diligence in order to ensure that it enhance and contribute effectively to the social aspect of the people construct.

In terms of the supporting or sub-systems, this construct would ideally include the following: Work “tools”; Infrastructure (organisational); Support and enablement. Each of the above sub-systems will have lower levels of resolutions contained within them, expanding on the content of each.

The Social and interpersonal needs construct is thus a function of Work tools, Infrastructure and Support and enablement. In summarised form this would appear as: “SIC = f(WT x I x SE). The following is a schematic view of this sub-system.

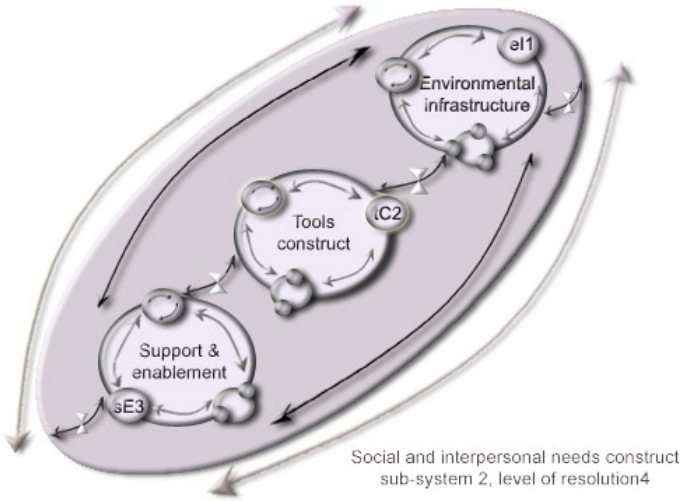

Figure D26: Social needs construct taken from the BAT software

The following are notes on the detail that would typically be contained within each of the supporting components of this level of resolution.

Infrastructure (organisational)

Similarly as for the provision of tools, another component is that of infrastructure we provide for people within the organisation in order to execute their tasks. Some of the key aspects within this sub-system include the physical building or office space; repository of learning (library or reference material); the organisational culture; and the structure or organisational design. All these components contribute to the fulfillment of social and interpersonal needs. Having a comfortable physical environment within which to work is much more conducive to people performance and their well being, instilling a sense of pride, importance and relevance to them and hence their social and interpersonal needs. Similarly, providing reference material or access to some form of repository (for example best practice models or concept solutions) provides them with additional tools to perform better and learn.

Organisational culture is another aspect that people value (working for a world-class company is used to enhance social standing and acceptability). Another organisational aspect relates to its physical structure or hierarchy of command; people tend to use their seniority within the formal structures as evidence of their social stature and achievement, in turn touching upon self-worth, esteem and belonging needs.

Work "tools"

This sub-system makes reference to the "tools" we use in our daily operations at the place of work. This may include various electro-mechanical equipment such as cars, tractors, mobile phones, servers, desktop computers, laptops, networks, etc. The reason for including "tools" under the social or interpersonal sub-component relates to the importance these "tools" have on people's perspective of their perceived value and importance in the organisation. Being supplied with the right or "best tools" is taken in context of the importance of their work and standing in the organisation.

The idea is not to ensure we procure the best possible tools, but rather to know that when we make these tools available to people, it is invariably interpreted as touching on issues of esteem, status, etc. Therefore knowing the interconnections of the supply of tools have on people, we should be cognisant of the impact it has on them and their environmental context.

Support and enablement

This sub-system deals with the supporting mechanisms that are expected to be in place in order for people to understand how and where they fit into the broader organisation. It aid's them to relate to what they are supposed to do, how they are supposed to do this and when it is expected of them.

These are the organisational specific requirements within the people construct, and relates to matters such as selection and recruitment; maintenance and training; policies and procedures; performance measures and criteria, communication, etc. These are the support mechanism expected by people from the organisation, and are issues geared toward supporting and enabling them to understand their roles and responsibilities and how their performance would be measured. It ensures that people are comfortable in terms of what is expected from them, the boundaries within which they are to operate, and the mechanism in place to assist them in achieving these expectations.

Abstract construct

The abstract construct is the third sub-system contained within the people architecture. This sub-system relates to the more spiritual and abstract beliefs, only present in humans. This is believed to be the one quality that differentiates us from the higher animals, reflecting, appreciation for music, science, justice, philosophy, inner peace, etc. These are the aspects, which relate to people's emergent qualities of non-materialistic form and shape (mathematics, physics, religion), all relating to a higher level of consciousness, not found in any other animal. This sub-system relates to Maslow's highest level in terms of his "Hierarchy of Needs", called Self Actualisation needs.

These qualities is said, makes us human, separating us from the rest of creation. It is the quality and ability we posses when we express ourselves and enquire about our world and the meaning of life. Thus, in terms of the people architecture concept, it forms a core sub-system, thereby requiring us to incorporate its elements into the design parameters since it has a fundamental impact on how people think and behave. The following is a schematic view of the abstract construct (lower level of resolution), which support and form an integral part of the people architecture. The Abstract needs sub-system promoted in this context, is portrayed as a function of Wisdom and knowledge, Nature of the work, and Learning. This is written as follows in terms of the abbreviations: “ANC = f (WN x NW x L)”. The diagram below depicts this sub-system.

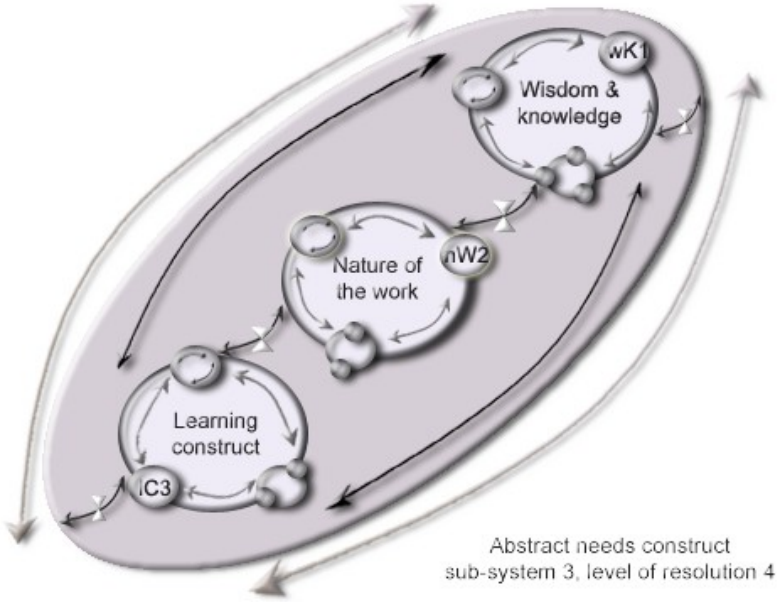

Figure D27: Abstract needs construct taken from the BAT software

As can be seen, this sub-system focuses on non-material needs, and people's emergent quality of mind. The key supporting sub-systems have been expanded upon below in broad outline.

Wisdom and Knowledge

The traditional interpretation in most organisations of knowledge and wisdom tend to be narrowly interpreted as the specific requirements of a job description or position that need to be filled. Whilst the reason for this narrow focus is supposedly to ensure that the organisation procures the right person with the right skills, it often misses the broader wisdom contained in potential candidates.

Organisations tend to focus their search in two specific areas contained in explicit knowledge (similar job experiences and position profiles), as well as their preoccupation with implicit knowledge (implied by having a specific degree such as say, Finance). This approach usually ignores the huge potential of tacit knowledge. We search for the obvious criteria of qualification, usually at the expense of experience (wisdom from domains even unrelated to the specific job profile) that a candidate may present as an additional value added component to the organisation.

Taking this a step further, we seek creativity and ingenuity, by virtue of unlocking people potential in a broader manner and thus encourage the creation of wisdom and the move toward a knowledge-based organisation.

Being appreciated, acknowledged and supported because of your knowledge and wisdom is an equally great reward, to that of the more obvious ones of a monetary compensation (salary, bonus, promotion, etc), hence its inclusion into this sub-system.

Nature of work

As part of the abstract needs component organisations often ignore that people are directly impacted by the nature of their work in a fundamental manner. Our skewed perspective on the hierarchy of work (office workers are better than the more labour intensive type work) is so ingrained in our society that this too has unfortunately become a reality. This perception thus need to be fixed over the longer term but require organisations to understand the impact it has on people, and hence their output. The purpose is to highlight the importance and nature of the tasks, being integral to the success of the organisation (if the cleaning team does not keep the boardroom free of litter, dust, etc, then it has a direct impact on the client and his perception of the organisation, the janitorial activity thus having a direct correlation to the organisations ability to secure business and to remain viable).

So too are the efforts of the “mailman”, the “secretary”, the administration support, etc. Unfortunately most organisational mindsets are such where they allot little value to these “back-office-functions”. This sub-system thus requires us to ensure that the nature of the work is contextualised in terms of the broader system, creating awareness that incumbents in these positions relate to how they fit into the success of the organisation, creating a sense of belonging and interaction within the system.

Learning environment

Another core aspect of the people construct is our disposition to learning and understanding, be it work related or personal. Our consciousness and emergent qualities continuously drive us to learn more in the quest to have a better understanding of what we do. It is this thirst for learning and improvement that has been included as a core sub-component of the abstract construct of the people architecture. Consequently, to have a learning environment or a workplace that espouses the concept of continuous learning and improvement, feeds our abstract needs, forming a core element in terms of people architecture. Promoting a learning environment has not only a people impact, but because of the increase in knowledge, the organisation also benefits by virtue of greater effectiveness, improvements in doing tasks, having people or human resources with increased intellectual ability, growth and personal mastery – all of which leads to a symbiotic benefit (organisation and individual).

Technology architecture

The technology architecture is the third sub-system that completes the tactical architecture. This sub-system is concerned with the technological enablement of the business and has been designed to retain only the core components of technological tools. This level of resolution is in turn supported by three sub-systems, summarised as:

(i) Data architecture;

(ii) Application architecture;

(iii) Hardware architecture

These three sub-systems seeks to represent the global technological enablement landscape. The data construct refers to the information constraints, reporting and collection needs, etc. The application construct, make reference to the multitude of software applications or suites of software solutions that we deploy to allow our automation (desktop applications, scada system, financial application, etc). The hardware refers to the physical machinery required to perform functions relating to areas of data processing, data transport and data storage capability (laptops, desktop computers, servers, etc.), this interpretation also includes network infrastructure and all peripheral equipment (printers, fax, etc) that are needed. Due to the rapid development in technology, this segment of the architecture may require much greater attention regarding updating it to incorporate ever growing applications and tech tools (e.g. mobile phones and its wireless, 3G) impact.

The concept being promoted here is thus in keeping with the notion of moving away from product centricity to process focused (systemic) solutions. The importance of this stance is to ensure that the Business Architecture promotes the concept of “open systems” or “open architecture” to ensure there is limited or no technology “lock-in”. This enhances the robustness and retain a sense of neutrality in terms of products and vendors (software and hardware vendors). This position ensure we identify technology as an integral component of the business, with the proviso that it must service the needs of the business, and not the other way around where technology dictates fundamental changes in a sound business process or business model. This seemingly subtle difference in fact has made huge corporations make large investments in technology, only to be disappointed by the value created in comparison to the investment made. This Technology architecture view thus promotes the concept of being technology focused (since it forms an integral part of the tactical architecture), but mitigate against a common view of being product-centric as opposed to being process-centric.

The model appreciates the vital linkages and efficiencies of technology, but preaches a more cautious approach in that the business must inform technology choices (it is senseless to procure state-of-the-art technology when the business does not require this to survive or function effectively).

Indeed in some instances, it can be argued that technology does drive the business, however, the truth of the business model is that at some point in the process, there must be non-technology input (e.g. human) – therefore technology merely acts even in these situations, as key enablers of the business (e.g. Amazon.com). Thus, the technology architecture is a function of the Data architecture, the Application architecture, and the Hardware architecture, and in terms of the abbreviated format, can be expressed as: "Tea = f (DA x AA x HA)".

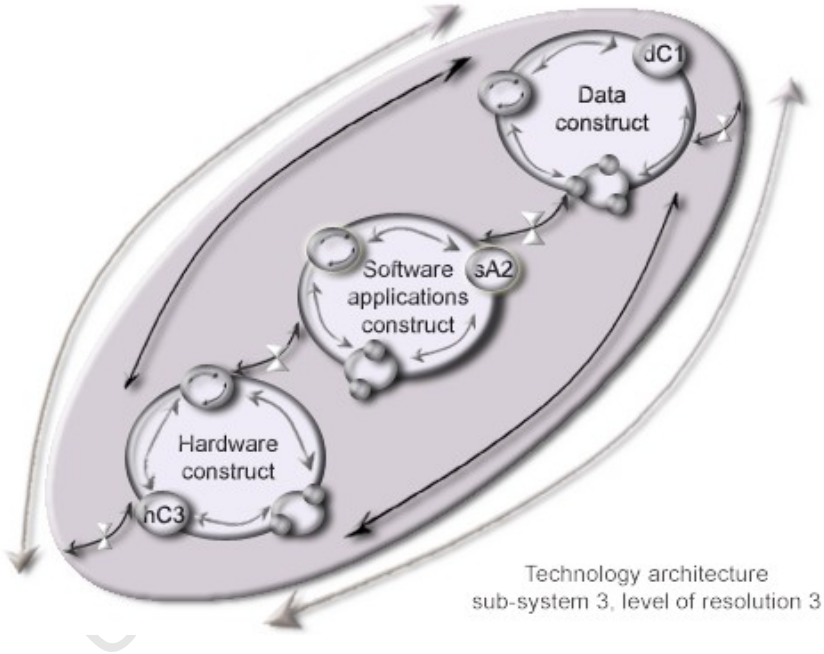

Figure D28: Technology architecture taken from the BAT software

Each of these sub-systems should ideally be present in any business regardless of shape, size or function. These are the elementary technological support systems that are generally required.

Data Architecture

As a sub-system, supporting the technology architecture, this segment probably forms the most important aspect of any large-scale deployment of software solutions. Essentially, this sub-system is constituted of two supporting elements, these being the logical data models and the physical data models. Each of these supporting sub-systems plays an equally important part in respect of developing a robust and effective data architecture.

Data Architecture essentially centres on data modeling, which is a collection of a number of techniques, and approaches that are designed to help define and map the information requirements of the application in question. Some of the key considerations in the modeling arena include: Specify & identify the various information types; Specify & identify relationships to other information; Note & map governance issues (policies, procedures & business rules).

The traditional tool used by technologists for this exercise is what is called entity-relationship-modeling, and inherently the technique focus upon, and targets repetitive components in the process, which in turn will identify the entity types, their relationships, attributes, etc.

This simple approach is embedded in a series of iterations, or steps that are repeated as part of the technique, until all entity types are identified and defined. The next phase of the technique requires what is called normalisation. The normalisation activity is geared toward refining the data model, and to yield an understandable and executable map of the data architecture. The entity-relationship-modeling process is depicted graphically below.

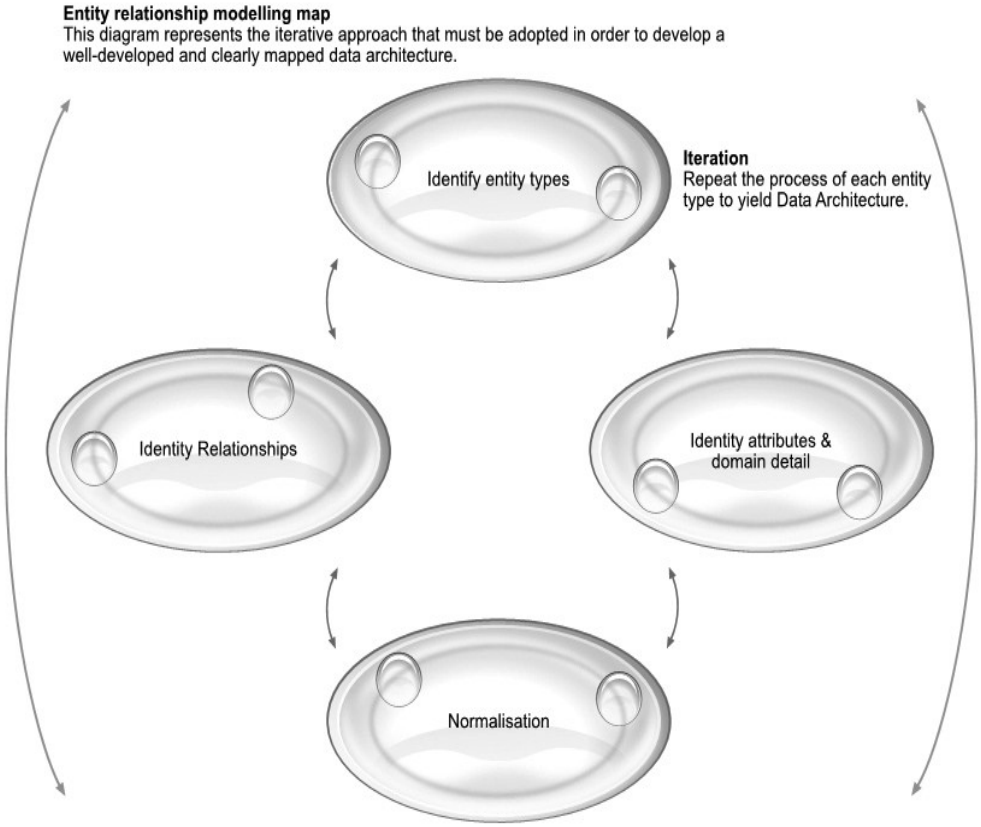

Figure D29: Entity relationship modelling taken from the BAT software

The diagram above represents an iterative and repetitive approach in obtaining a well-defined and mapped data architecture. Considerations in this process include the techniques used in the identification of entity types.

Some users may include review of existing data models; review business requirements; review information from current systems; and reviewing the process model. In some instances more than one can be adopted to ensure a greater coverage of the business rules and entity type variation.

In the categorisation of entity types, distinguishing between core types; specialisation types, Super and sub-types, are important. Proper categorisation of entity types will ensure less re-work in event of conflicting data models. The same would apply for the various relationship types (these could include many-to-many; one-to-many; their characteristics like non-transferability; mutual exclusivity; etc). In terms of the identification of attribute types, key considerations must include identification of data type (is it numeric, voice, character, etc); Identification of domains (the value sets that applies to one or more attribute types); Group Vs individual attributes; Naming conventions and attributes; multi-valued attributes, etc. A key aspect in this process is defining the attribute type domain. Domains being a set of attribute type's possible values (e.g. for a date field, it can be represented as 01/01/1900 or 01/01/2100).

To ensure robust domain attributes it may be wise to remember the identification of business requirements and business rules to obtain an acceptable range in attribute sets; Identification of the types of information; and the user range.

The next step in the process of entity-relationships is the aspect of normalization, which yield the validation and refinement of the data model. Without this component, the data design and data structure will have reduced integrity and stability. Usually 5th or 4th Normal Form is used in the normalisation deliverable. The 4th Normal Form is however the most commonly used, which include all multi-valued attributes being split into separate entity types; those attributes not dependant on unique identifiers split into separate entity types; etc.

The Data Architecture component, as mentioned is thus a function of the Logical data models, and the Physical data models. In terms of the abbreviated notations used, this sub-system may be reflected as: "DA = f(LDM x PDM). This sub-system is depicted below.

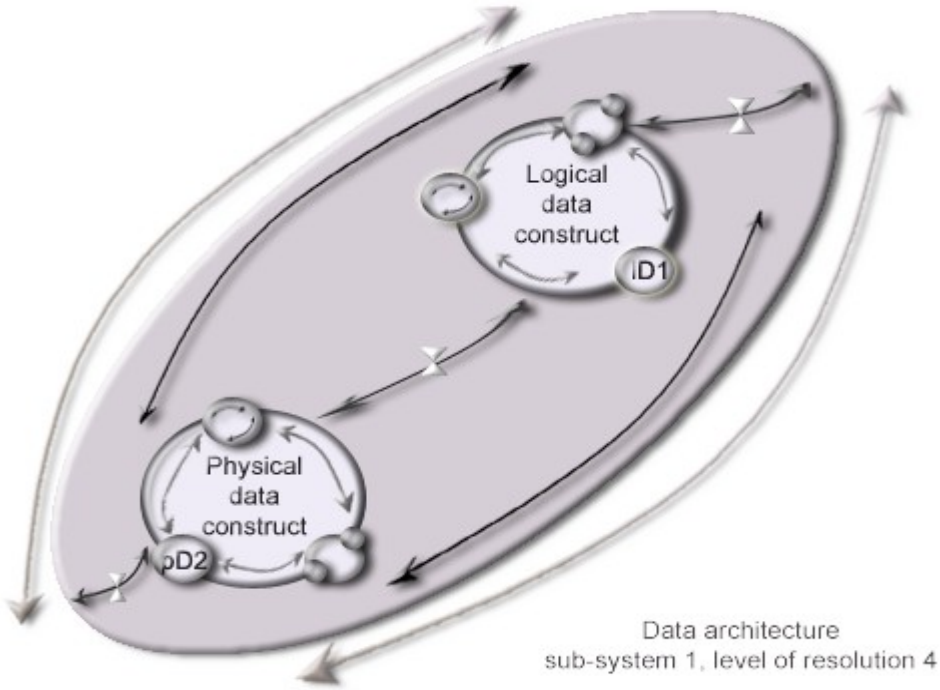

Figure D30: Data architecture taken from the BAT software

As can be seen by the schematic above, the data architecture has two core supporting sub-systems (logical and physical constructs). These will in turn have its supporting sub-systems, at even lower levels of resolution. These have been expanded upon subsequently.

Logical data construct

This component of the data architecture relates to the documentation of the logical data structures (which are supported by the file management software and the database management system). Usually the design considerations here are biased toward the end-user and the application designer. Relational database design will also include work such as primary keys, tables and columns, row lengths, code tables, etc.

An important aspect is to note that changes to packaged software solutions (common of the shelf products), is used to document changes to the baseline application. As input to this work, clarity on database design and execution planning must be completed.

The core elements in the logical data construct is a function of its supporting sub-systems, which must include as a minimum, Table definitions, Data & file definitions, Record and relational tables and Referential inputs. Depicted in terms of the models shortened notation this would appear as: “LDC = f(TD x DFD x RRT x RI)”.

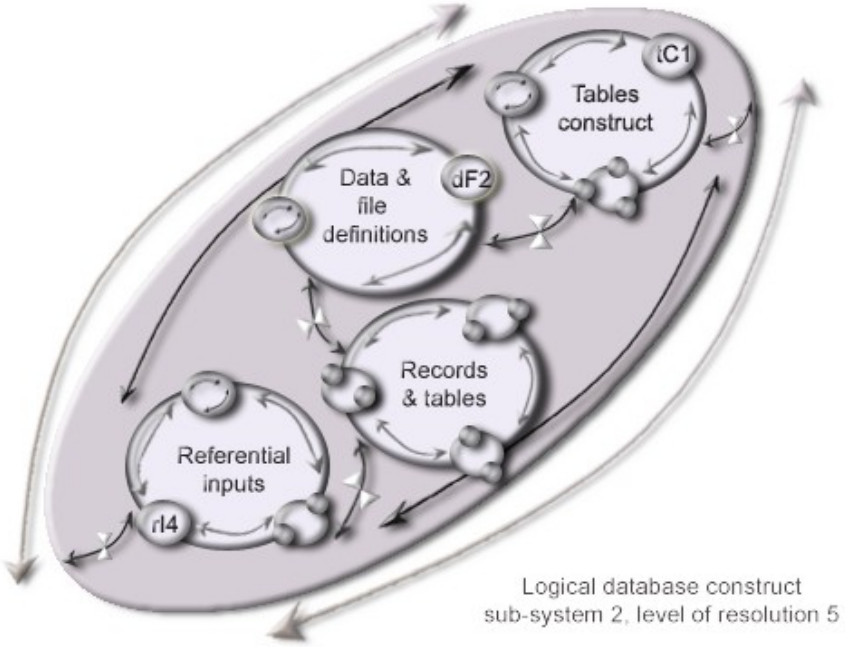

Figure D31: Logical database construct taken from the BAT software

Each of the supporting sub-systems indicated above, are touched upon hereunder.

Tables construct

Defining the code table – is an activity that requires dedfinition which include keys, decode values, codes, as a base input requirements, in order to deliver a fixed set of data keys and its associated values for the date element. This is also used to track changes or amendments made to baseline software packages. Simple fields such as record name, effective dates, language, keys, etc are required as standard components.

Data and file definitions

This sub-system, in turn has two core supporting sub-systems, which are: Data element definition; File definition.

Data element definition - describes the data element used in the application, hence issues such as data types (alphanumeric, Boolean, etc), formats (patterns of storage), internal precise lengths (decimal spacing formats), display format (user interface), etc are all defined and understood upfront.

File definition – refers to the organisation of the file storage to be deployed for the data (assignment usually executed by database administrator (DBA)). Issues such as function (type of database), Access (access protocols like virtual storage access method (VSAM) or index sequential access method (ISAM)), Default access (most common manner in which access is achieved, e.g. sequential, dynamic, etc), organisation of files (how they are stored), record formats (primary keys, lengths, alternate keys, etc).

Records and tables

This sub-system, also has two key supporting sub-systems, which are: Logical database design; Records definition.

Logical database design – shows the relationships between logical components of a database and is an integral part when deciding on a database structure such as relationship tables. In complex designs, a modular approach is often used, with high-level summary diagrams. Typically such diagrams would contain tables, relationships, cardinality (min/max table rows in a relationship), etc.

Records definition – this segments describes the data structures of data elements, which are read and written as unit by a program. This information is used to describe the layouts for each record, table, message and data in the application.

Reference inputs

This is the fourth sub-system within the logical data construct, and in turn have three supporting sub-components, these are: Referential integrity; Relational table definitions; Relational view definitions.

Referential integrity constraints - this references the rules that must be maintained in the database to ensure referential integrity (including reference rules and the rules required to maintain them). These outputs are generally used by developers and programmers, as opposed to the database analysts (DBA's) that require higher-level views. Typical activities in this segment will include child-parent tablet, targets and updates, etc.

Relational table definition – this work defines the organisation, the storage, the access methodologies when interrogating the database, and is an integral part when dealing with relational databases (usually created or generated by an expert like an analyst, DBA or database administrator (DA)). Core elements in this area include Null flags, Primary flags, trigger sets, modular data sets, etc.

Relational view definition – this activity defines the information display or user interface picture, and is based upon relational tables, specialised views, etc. Thus key considerations here include table views, view types (application or system), column and row names, etc.

Physical data construct

This sub-system of the data architecture is dedicated to the physical storage and access protocols that the application data requires to function, thereby forming an integral part of the data architecture. This area take its predecessors input since it uses that information and input in context of the design that must be implemented and deployed (usually what non-technical people refer to as the " IT system").

There are two supporting sub-systems to this activity appearing at a lower level of resolution. Consequently, the Physical data construct is a function of Physical database design, and Relational & table definitions. The shortened notation would thus appear as: "PDC = f(PDD x RTD). This is schematically represented below:

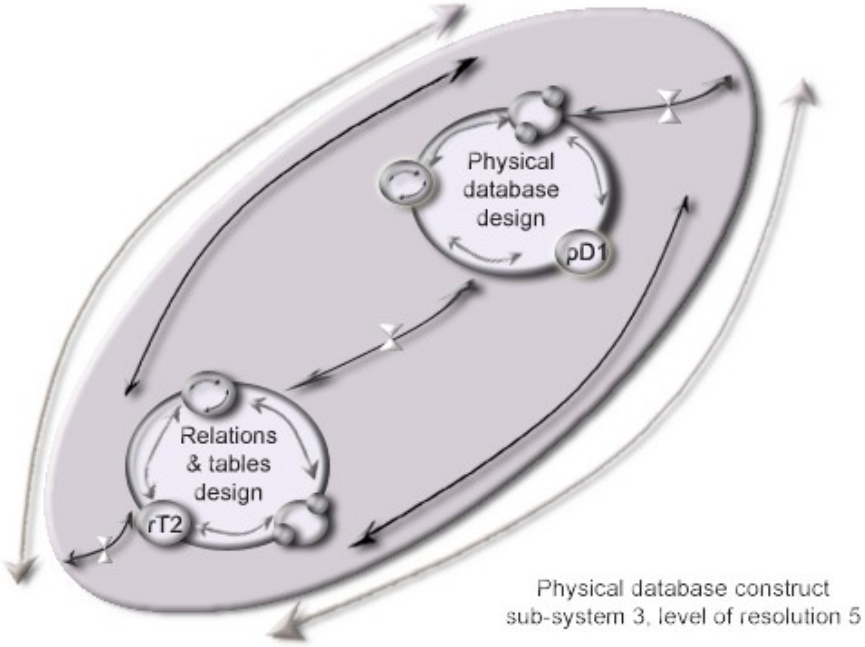

Figure D32: Physical database construct taken from the BAT software

The two sub-systems contained within the physical data construct will contain lower level supporting sub-systems. Some of the important detail resident under each of the supporting sub-systems are provided below.

Physical database design

Physical database design has three core supporting sub-components geared toward ensuring that the structure of the database is designed in such a manner as to have the capacity to provide for the queries in an effective and non-conflicting manner. Key activities under this supporting sub-system include: Database definition; Database space worksheet; Database file system map.

Database definition – this segment captures the aspects of the database such as indices to be used, tables to be used, the various views, table spaces, etc. In most instances very specific or "tailor-made" requirements may be needed (the magnitude of the changes usually depending upon the product-set and the organisation type – e.g. Public sector and private sector have very different capturing and reporting requirements). Key considerations in this segment include sub-component names and types, database type, the management system in place or in use, etc. Additional constraints that are important are issues such as disk configuration, log sizing, parameter settings, segment sizing, etc.

Database space worksheet – these are the detailed deciphering of the assumptions used to determine and calculate the space requirements for the database. The exact formulae used are dependent upon the type of database being designed (e.g. relational). Key considerations in this segment of the work include factors such as Table names, Index names, Lengths of rows and indices, column parameters, Average, Maximum and Extra data calculations, density of disks, etc.

Database file system mapping – this sub-segments activity is where the definition of the sizing estimates for the application data are determined. This calculation includes the detail needed to incorporate the performing of recovery work and related data disaster management, hence the dependency on input from the data architecture.

Relations and Tables

Key activities under the second supporting sub-system of the physical database construct would include: Relational index definition; Table spacing definition. This sub-system has two core supporting sub-systems, both complementing the access pathways and the database table spacing detail. The sub-systems providing the support are the Relational index definition, and Table space definition.

Relational index definition – this segment delivers the physical index that provides the access path to the tables in the database. The design will also include the identification of the columns that are needed to form the access paths. Key considerations here are Unique and Ascending flags, Data elements, etc.

Table space definition – in this segment of the supporting sub-component, the focus is to define a detailed requirement in order to generate the table spacing requirements of the database. This activity should thus describe and provide context to the physical database design. When determining the table space strategy key considering include static data and free space allocations, referential data needs, as well as partitioning and locking aspects.

Application Architecture

The application architecture is the second sub-system within the technical architecture. This level of resolution describes all aspects of the business architecture which are to be enabled using various technologies and takes into account issues such as how the application will deal with control procedures, distributed processes (regions, foreign offices, etc); core activities of the organisations; its operation models (outsource, co-source). This sub-system can be deconstructed into lower level sub-systems:

Application software definition and relationships; Application software models for the scope, data & processes; Application software. The Application architecture is a function of the Application software definition & relations, Application software model, and the Application user detail. In terms of the shortened notation, this would appear as: “ApA = F(ADR x AMSD x AUD).

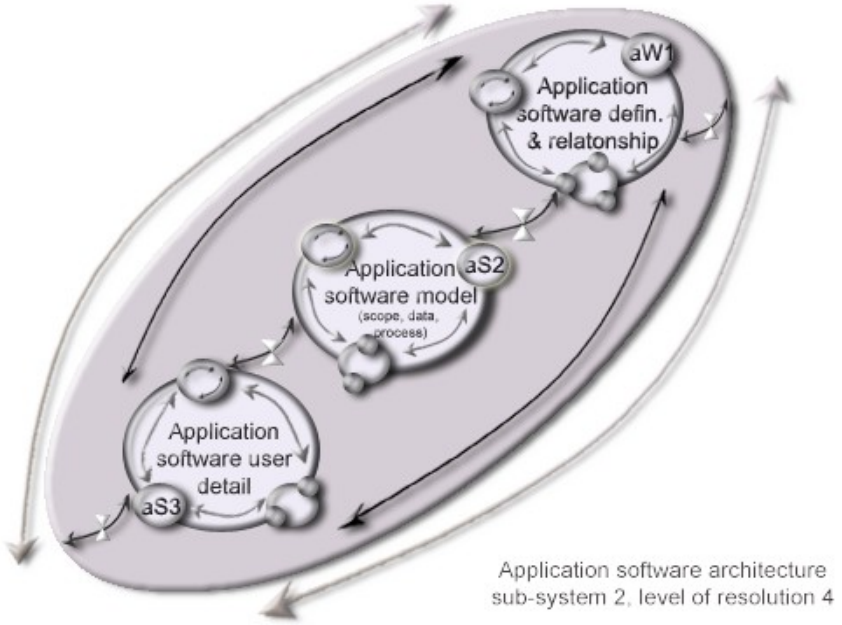

Figure D33: Application software architecture taken from the BAT software

The above diagram reflects the three core sub-systems that support the application software architecture at a lower level of resolution. The supporting sub-systems have, in turn a number of lower level supporting sub-systems, which are touched upon below.

Application software definition and relationship

The first sub-system is that of application software definitions and relationships, which is a function of Application software definitions, and Application software relationship diagrams. Written in the models shortened form, this may appear as: “ADRC = f(AD x AR)”. The diagram below depicts this level of resolution.

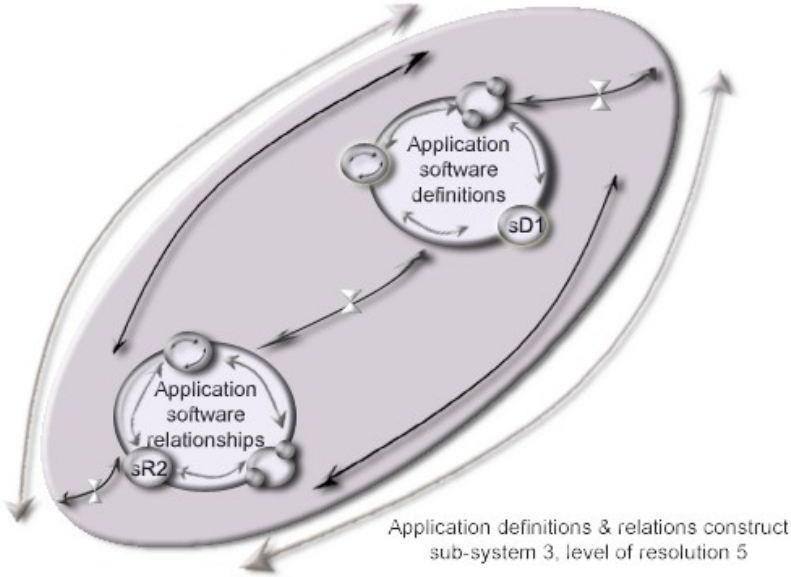

Figure D34: Application definitions and relations taken from the BAT software

From the above diagram the first subsystem (application software definitions and relations), would typically contain some of the following supporting sub-components:

Application software definitions

This component describes key characteristics of the applications which are to be included in the business architecture. This segment is relied upon to identify and generate the various application software requirements to enable the business requirements and its intended capabilities. A major contribution in this exercise is the identification and listing of the applications, including their respective boundaries (data and process distribution) that will suit the business as a whole (total business requirements). Key considerations are those of data volume, retrieval and interrogation frequencies, to ensure a robust and functional application design set. Supporting sub-systems to this construct would typically include:

Descriptions – the names of applications and their respective general descriptions, the grouping of applications into suites of solutions and modules which support core functional areas such as production, planning, etc. Usually these are grouped in terms of families of related business policies and rules like all the ones say applicable to design, or those relevant to production, etc.

Characteristics – characteristics and functionality of the application must be noted and listed since it will enhance and support the business processes underlying them. Detail such as service characteristics must also be known and accommodated for during this process.

Interfaces – this segment is intended to resolve the interface issues such as human resource requirements, financial reporting requirements, production detail, management and control functions, etc. Notes must be made of the key inputs and outputs of all of these interfaces to ensure an integrated approach.

Linkages – core linkages to other areas of the business architecture must be mapped and planned for. Other factors such as policies, risks, constraints (like investment, etc), delivery mechanisms (such as single source, open tender, etc).

Application software relationship diagrams

The second supporting sub-system of the applications software and relations construct is that of the relationship diagrams. This component describes the applications that are part of the business architecture, and how these communicate and interact with each other. This segment is vital in the sense that it yields a better understanding of the concept of an integrated architecture of the portfolio of applications. There are a number of supporting sub-systems to this activity, key of these are touched upon below.

Analysis of application requirements – this area deals with the development of a formal model of information gathering, creating a cohesive and inclusive model of the application, capturing the process, the content and the data. This approach is iterative (usually prototype or paper based), and is repeated until stakeholders agree and sign-off on the model. Typically such a process could be depicted as follows:

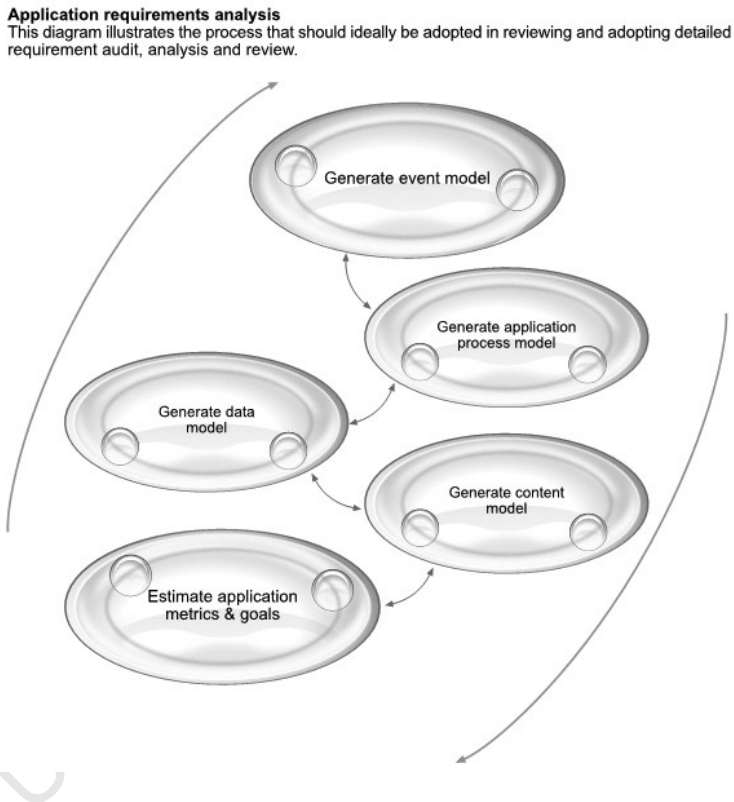

Figure D35: Application requirements taken from the BAT software

Planning considerations here include performing a verification or second set of requirements gathering in order to obtain a refined set of requirements for analysis and review. Key to remember in this exercise is that models are merely abstractions of reality and that over analysis does not imply a perfect fit, hence an iterative approach is reinforced.

For larger scale projects, fracturing the intervention into integrated min-projects may help adhering to timelines since the reduction in complexity is mitigated to a degree, whilst still allowing for parallel implementation under one programme.

Analysis of application requirements – segment of the work takes precedence over initial design attempts as it uses input from the requirements gathering and analysis segment. This activity yields the requirement models which feeds into the eventual applications design.

Analysis of technology infrastructure – this activity predominantly looks at the hardware aspects that are required by the software, and also identifies additional requirements in terms of technological hardware. Key considerations in this segment include coordination with hardware architecture, the physical environment, training issues, procurement, vendor issues, etc.

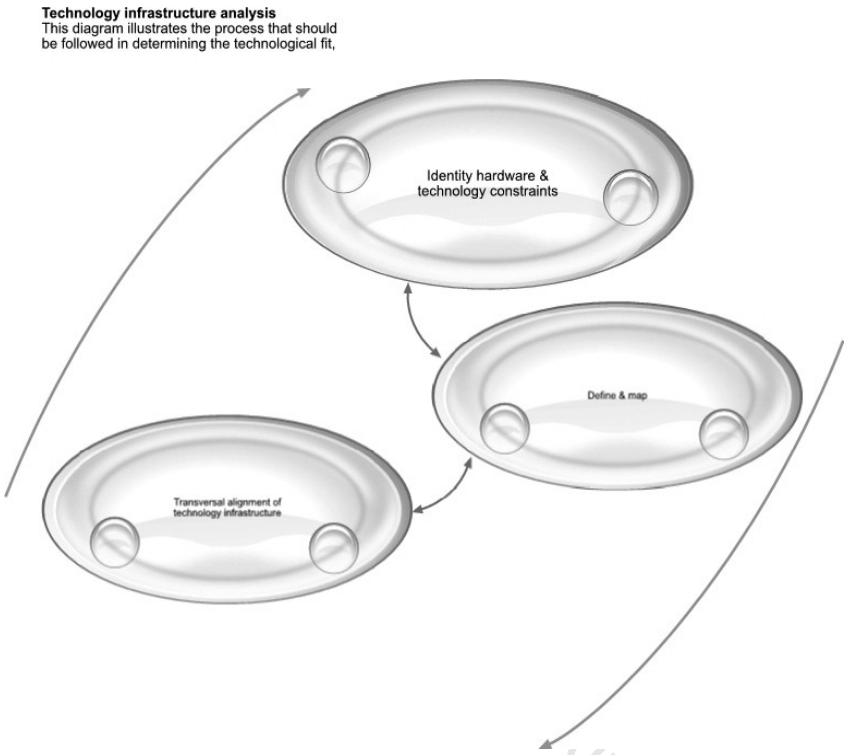

Figure D36: Technology infrastructure analysis taken from the BAT software

Assessment of software vendors (COTS) – this segment is used to verify potential software packages that have a broad "fit" to the business requirements. Today much of this information is quite accessible particularly from vendors that are reputable, as well as ratings agencies, which spend a great deal of research in ranking the packages in terms of various criteria. Also, past experiences and reference sites makes this activity easier to deal with. Considerations here include having standard criteria of evaluation, avoid information from unreliable sources, review and test vendor claims, verify compatibility to other business architecture aspects (e.g. hardware, etc).

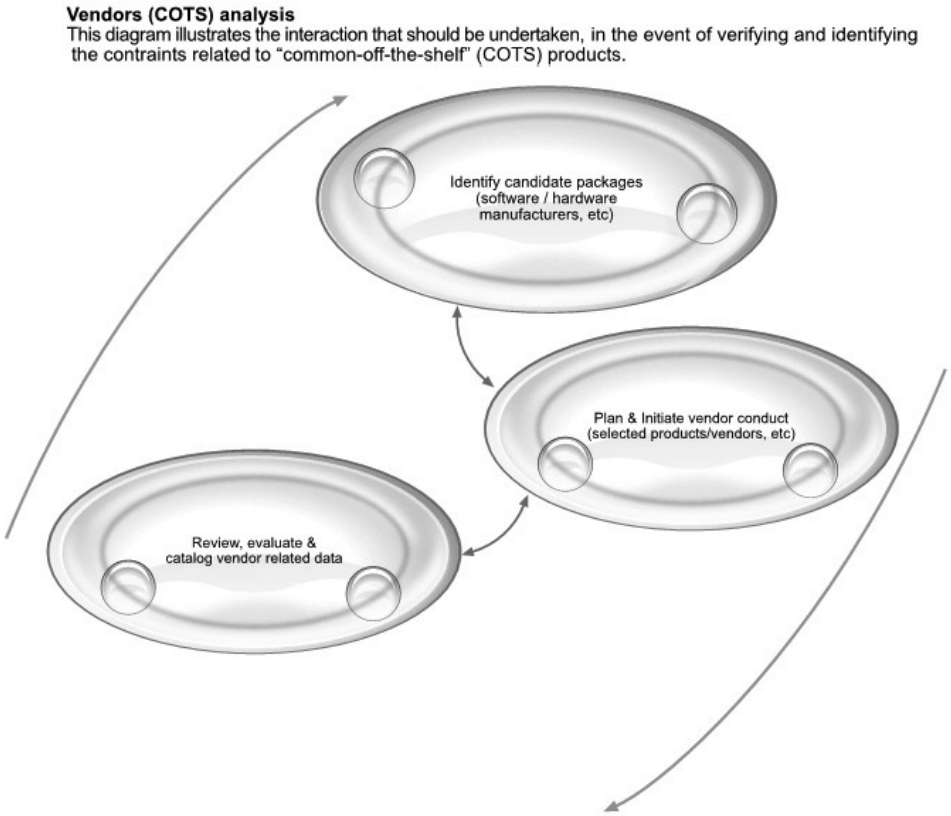

Figure D37: COTS analysis taken from the BAT software

Conducting pilots and vendor demos – This activity handles the issue of observing and validating pilots or demonstrations by vendors, tabulating these on a score sheet for review. Key observations here include selecting a neutral demo site, review vendor data, ensure core project team members attend and test demonstration assumptions, follow up and quality assurance by vendors to be done in writing, ensure no commitments are made to vendors, ensure evaluation of different vendors take place without much time gaps between them, verify process models and interactions on process architecture.

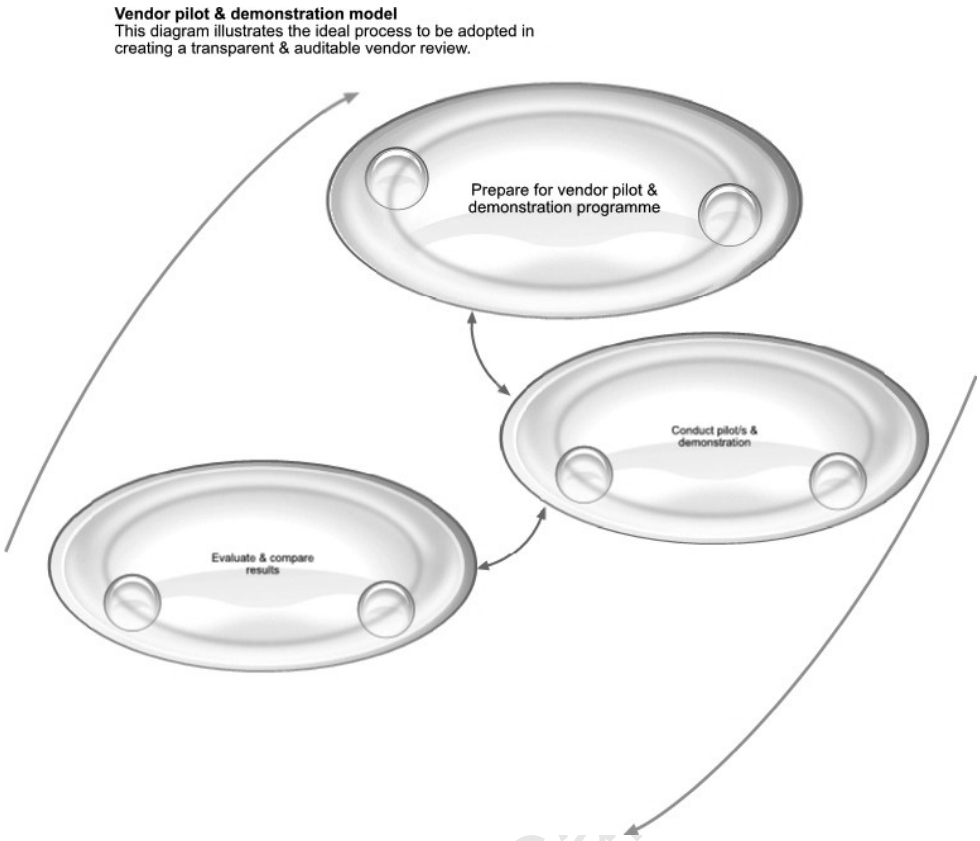

Figure D38: Vendor pilot demo's taken from the BAT software

Define application architecture – This sub-segment provides input into the overall design decisions. The approach usually adopted reduces the application to its constituents, in order to reduce the complexity of the development and maintenance. The application should be mapped onto the execution and operations constructs. Key considerations here are ensuring the software architecture arrived at is appropriate to support the business needs, other key issues are – revisit and review current application architecture, document and map architecture, identify and resolve conflicts within the architecture, map and verify integration and inter-relationship aspects.

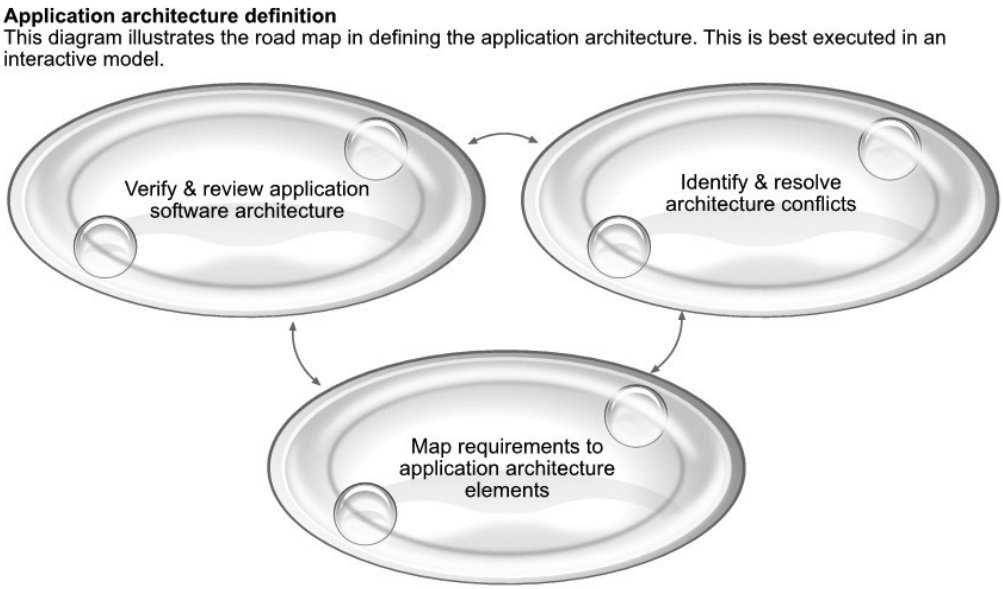

Figure D39: Application architecture definition taken from BAT software

Application interaction definition – This sub-component is used to identify automated tasks within the process flows and help start the initial designs regarding user interaction, by designing the application interaction. This segment also maps and identifies the human interaction required to fulfill the business needs. Key assumptions are – map difficult and complex interactions first, focus on critical aspects of the process, map the software application intersection points (particularly for architectures not supported by packaged software), cascade work into logical units, continuous iteration, check for re-usability, etc.

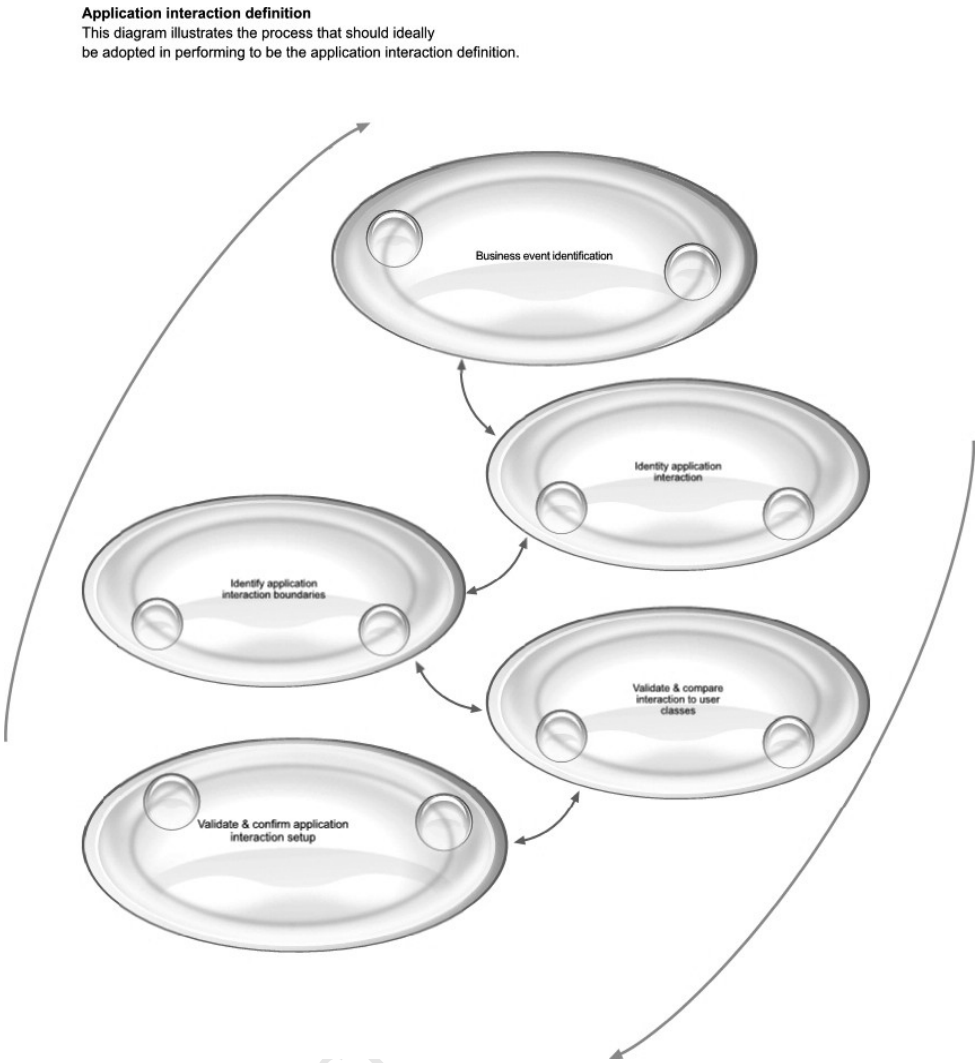

Figure D40: Application interaction definition taken from BAT software

Other equally important sub-systems and elements within this construct include:

Examine business scenario;

Define processing flow;

Design application architecture;

Design application interface;

Design process, skill and user interaction;

Design customization;

Develop and select software vendors;

Identify application requirements;

Identify application user requirements;

Prepare technology infrastructure;

Recover current application design;

Review and finalise hardware architectural constraints;

Survey and scan potential vendor candidates;

Validate technology infrastructure

These are some of the key steps that must be undertaken if a complete exercise is to be executed in terms of the application software architecture.

Hardware architecture

This is the third major sub-system that comprises the higher-level of resolution of technology architecture. The hardware architecture can be interpreted as containing all tangible technological enablement (all aspects of the technical architecture that excludes software). The model attempts to classify these hardware elements into three supporting, lower level sub-systems, and is seen as a function of Processing and memory construct, Networking construct, and the Peripheral construct. Written in the models abbreviated form, this would appear as: “HA = f(PMC x NC x PC)”. The diagram below depicts this graphically.

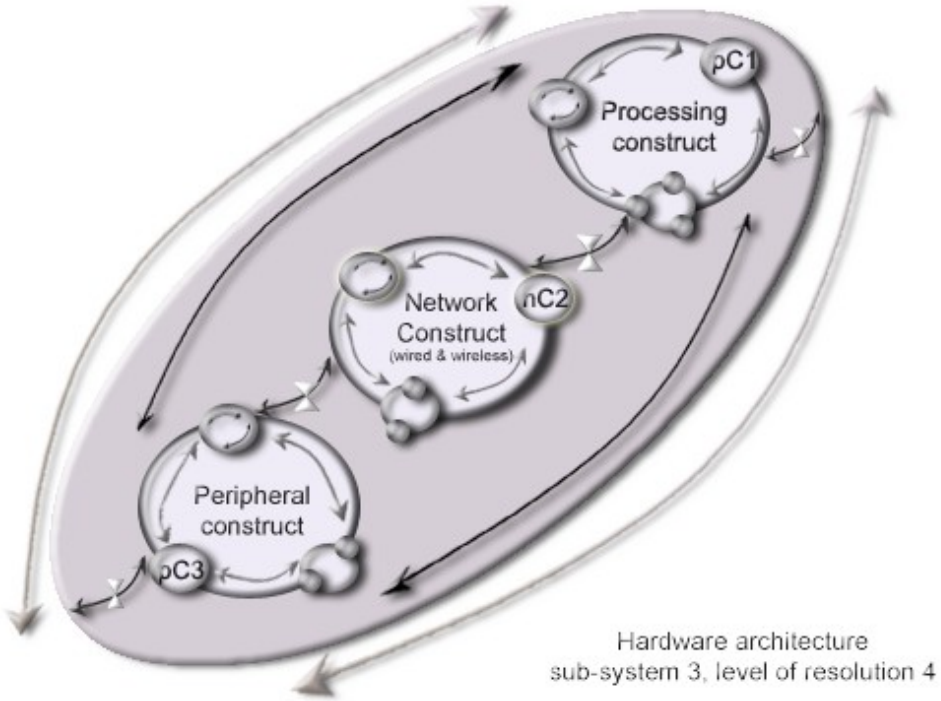

Figure D41: Hardware architecture taken from the BAT software

The three sub-systems intend to reflect the higher-level hardware needs in a holistic manner. These sub-systems have been decomposed into their respective sub-systems hereunder.

Processing and memory construct

This sub-system deal with the processing and storage capacity of the hardware requirements, ensuring that the processing speeds and storage facilities required, are accommodated and planned for.

Based upon the progress in technology and Moore's law (processing power doubles everything six months), it may become costly and impractical to keep abreast of the latest technology. Thus the planning parameters and decisions on processing and storage, should always take into account immediate and future parameters.

These frustrations are very real, particularly when upgraded applications tend to require increasingly bigger processing and storage capacity, be it for desktops, laptops, hand held devices, servers, mainframes, etc.

Network architecture construct

This sub-system deals with all networking and connectivity matters covering, local area networks (LAN), wide area networks (WAN), the Internet (WWW) and related network access mechanisms (radio, wireless, etc). The network is the carrier of the volumes of data that are moved between point interchanges, therefore an integral aspect of the technology architecture. Basic network components would typically be:

Cabling – there are various types of cabling available to carry data (wireless, fibre-optic, copper-line, ASDL, ISDN, etc).

Network components & devices- these are the components that terminate and truncate the network points and access points, and include components such as routers, hubs, etc.

Peripheral architecture construct

This sub-system deals with all peripheral equipment, forming the last supporting sub-system of the hardware architecture construct. The peripheral architecture would typically include fax machines, modems, printers, copiers, scanners, combination peripherals, etc. These may be categorised in the following manner:

Copy & transmission devices - this segment would contain all devices that have a copying or transmission capacity such as Fax machines, Photocopiers, Scanners, etc. Modern devices in this regard seem to converge into a unified peripheral typology (fax, print, copy, all-in-one hardware solutions).

Printing devices - this segment will include those acquisitions that relate to printing, and may include Printers, Presses, etc.

Other hardware equipment - most peripheral equipment can be categorised into one of the above categories, hardware components such as digital camera's and digital projectors can be kept separate in a different category.

Many of these peripheral devices today are sold and packaged as one unit (multiple functional hardware), designed for networking capacity or single user capacity. All of which are considerations when making an informed choice. Factors such as the following would ideally impact these decisions: expected usage, support, investment and cost considerations, brand, etc.

The hardware architecture usually focuses on the more expensive equipment such as the network, the mainframe, etc. and do not consider the peripheral equipment as a major constraint. This may however is important from an asset management perspective, tracking change control issues; Effective service level agreements; Accurate support requirements insurances, and guarantees; Create and set standards for the organisation; Economies of scale and bulk purchasing; Mapping of software, hardware and processes (job descriptions). These are the most important reasons for promoting the adoption of such hardware architecture.

A robust hardware architecture become more pronounced when considering the bigger investments in terms of networking and processing. Under estimating or over estimating hardware support components such as the server sizes, number of processors, network capacity, can be extremely costly, often with dire consequences for the business (expensive downtime; too little bandwidth; insufficient processing capacity, too much storage capacity, license fees, etc). Other key considerations within this construct are issues relating to additional software packages, such as integration of system management tools; Diagnostic tools, Traffic regulation and monitoring tools, Virus control protocols, Telephony protocols, Internetworking of switches, hubs and routers, Network communication protocols (frame-relay, ISDN, ATM), Topology options (point-to-point, multi-point-to-point, etc), Peripheral equipment interfaces, Remote Access protocols, Power supply, disaster recovery, storage, etc.

Most of these issues are addressed in the generic process of devising a decent hardware architecture. The detail of which follows hereunder. The approach can be adopted across the three categories of hardware, with minimal process changes but would require more detailed requirements review, analysis and sign-off within the core sub-components of networking, processing, and storage.

The process which can be adopted across the hardware architecture include: Design and Prepare hardware infrastructure model; Analyse and verify hardware component requirements; Assess current hardware architecture; Validate hardware architecture; Hardware procurement and deployment. These components should generate a robust hardware construct if executed properly. This process be represented by the following diagram:

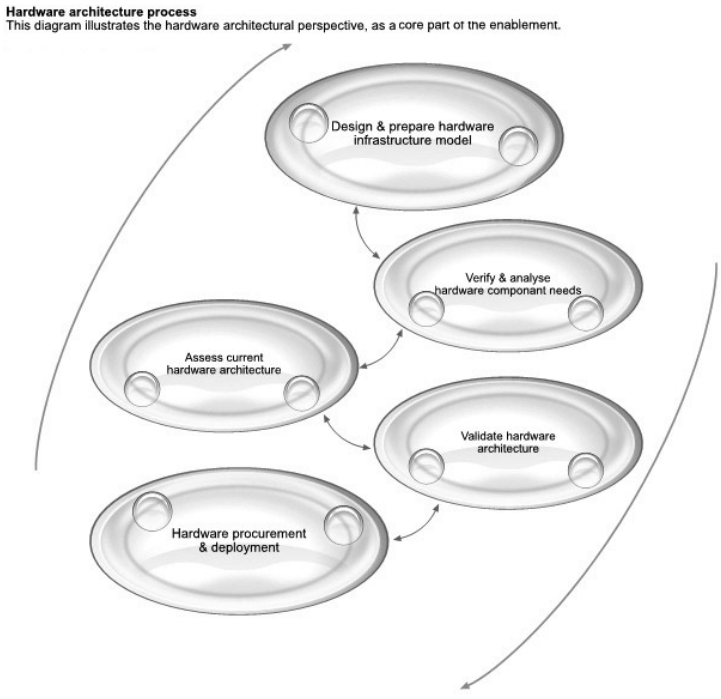

Figure D42: Hardware architecture process taken from BAT software

The process above reflects a high-level view of the detailed analysis needed to obtain sufficient information and technical requirements to ensure robust hardware architecture is put in place and maintained by the organisation. It also underlines the interrelatedness of the architecture. Some detail within each of the supporting sub-systems would typically include the following:

Design & prepare hardware infrastructure model – this sub-segment looks at the establishment of the performance goals on a qualitative and quantative level regarding the hardware. Ideally done by adopting an iterative process and include visiting a number of elements that have been executed before as part of the Business architecture (e.g. business performance model defines the characteristics of the bigger or organisational business capability, whilst the hardware technical performance model describes the expected performance characteristics for the hardware architecture). Analyses of the performance estimates must be realistic and have a long-term view, including network analysis needs.

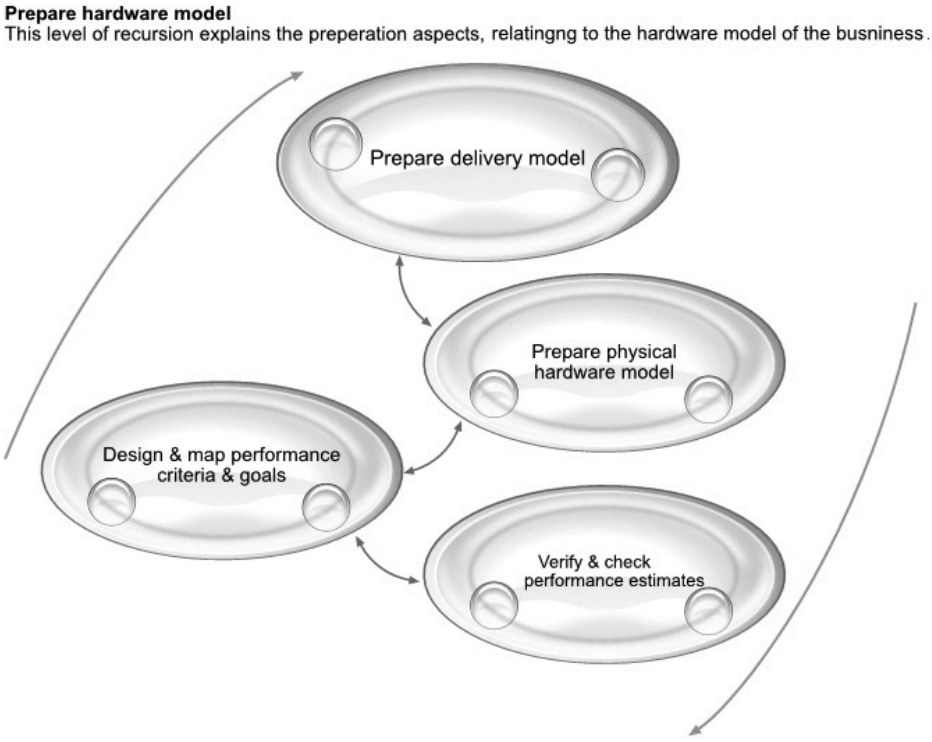

Figure D43: Prepare hardware construct taken from the BAT software

Verify & analyse hardware component needs – this sub-system deals with the detailed technical and functional performance required in terms of the physical hardware model. This step requires analysis and documentation for each of the components, verification of the application software must also be accommodated and mapped, so too must the process architecture be aligned to ensure an integrated view. Additional measures include training, support, etc.

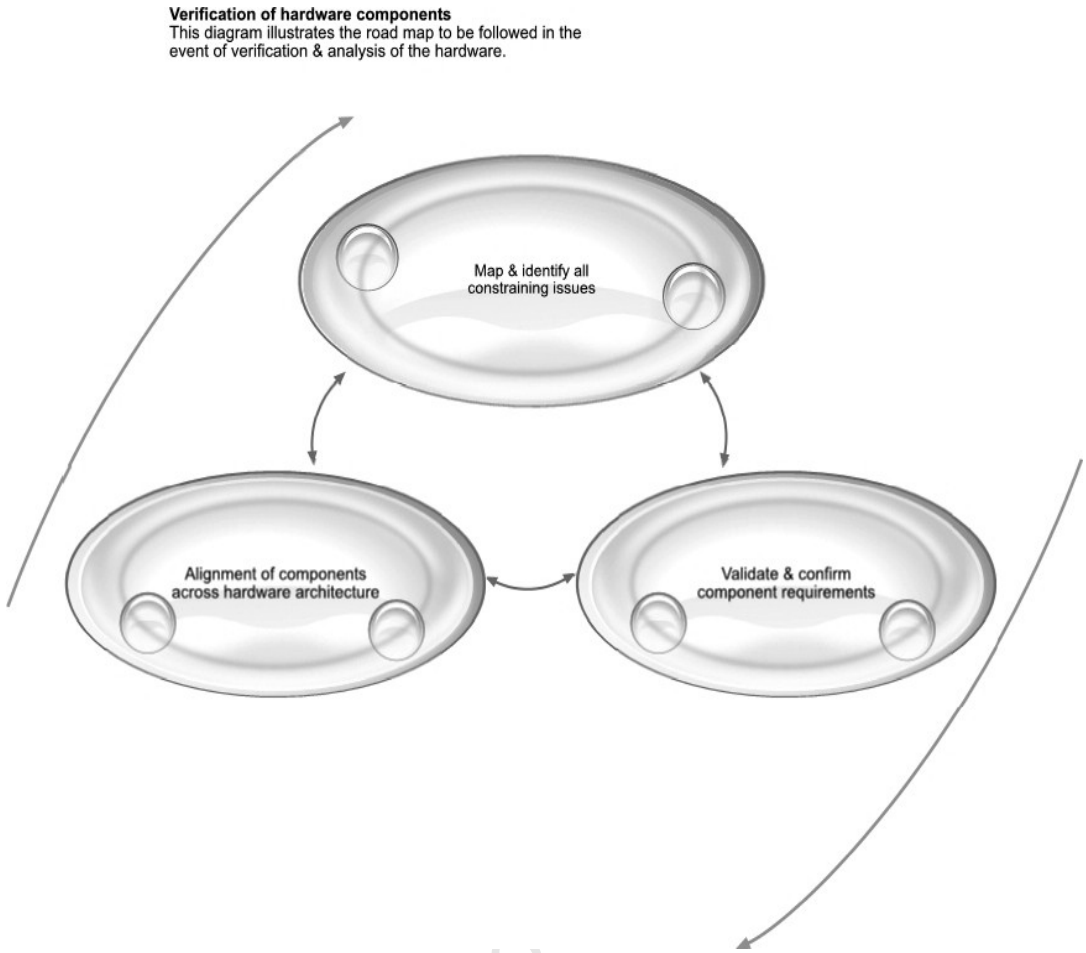

Figure D44: Verification construct taken from the BAT software

Assessment of current hardware architecture – this sub-system is focused on obtaining detail on any current or existing hardware that may be in place. These must be noted, assessed for continued use and interface to other segments and incorporated into the new hardware architecture. Two key steps in this process are: the creation of a gap analysis, as well as an update into the new architecture. The graphic representation spells this out clearly.

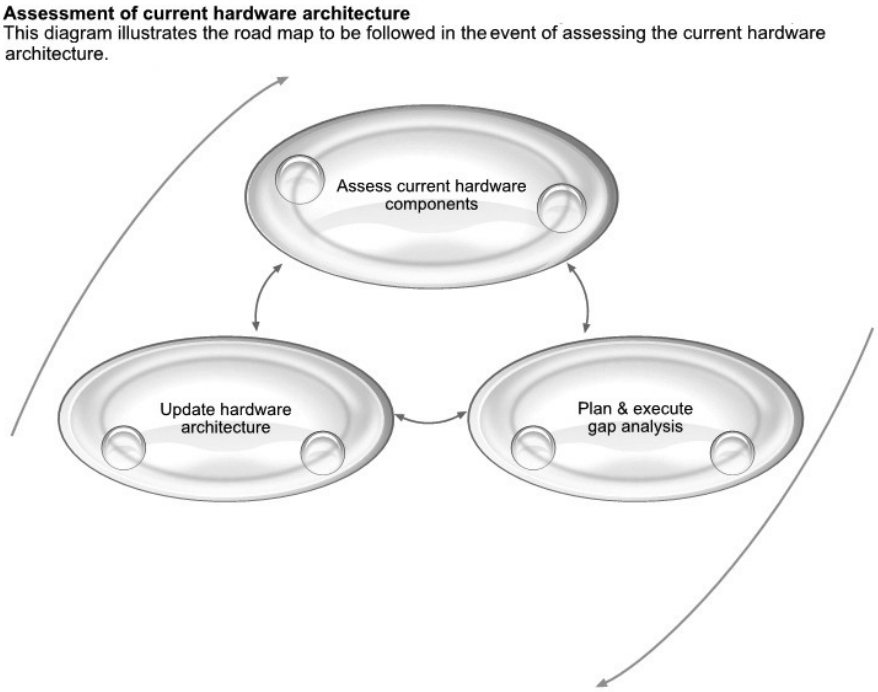

Figure D45: Assessment of current hardware construct taken from BAT software

Validation of hardware architecture blue print – the fourth supporting sub-system is that of validating the blue print for the hardware architecture. This is the final step and would typically incorporate visiting assumptions and checking how it is expected to impact people and process constructs. If all aspects are validated and agreed to, the next phase would be the acquisition and implementation aspect of the hardware architecture.

Hardware procurement & deployment – the fifth and final supporting sub-system is the delivery and installation of the hardware architecture. This activity therefore focuses upon the procurement and the deployment aspects. Key considerations include tender processes, legal conditions, import restrictions and delivery schedules.

Important aspects that must be attended to include: ensuring that contract management and project management principles are adopted to ensure limited liabilities and risks to the organisation. Another aspect is to retain manuals and related user specification in safe areas. Secure zones must be demarcated (on servers, main-frames, backup storage areas, safe rooms, air-conditioning, etc must not be overlooked).

Operational architecture

The Operational Architecture is the third major sub-system, contained within the Business Architecture, and represent the area of the organisation focused on the daily running and operations, as opposed to the Strategic Architecture which directs the overall efforts toward a specific direction, and the Tactical Architecture which is more concerned with the enablement or tools that are required to run the business efficiently and effectively.

The three core segments together thus represents a total picture of the organisation in a systemic sense (Business Architecture). The Operational Architecture is therefore focused on matters of operational management, and should, as a minimum be a function of an Operating & delivery construct, Audit and assessment construct, and the Re-alignment and implementation construct. In terms of the models notation, this would be expressed as: “OA = f(ODC x AAC x RIC)”. This view is depicted below.

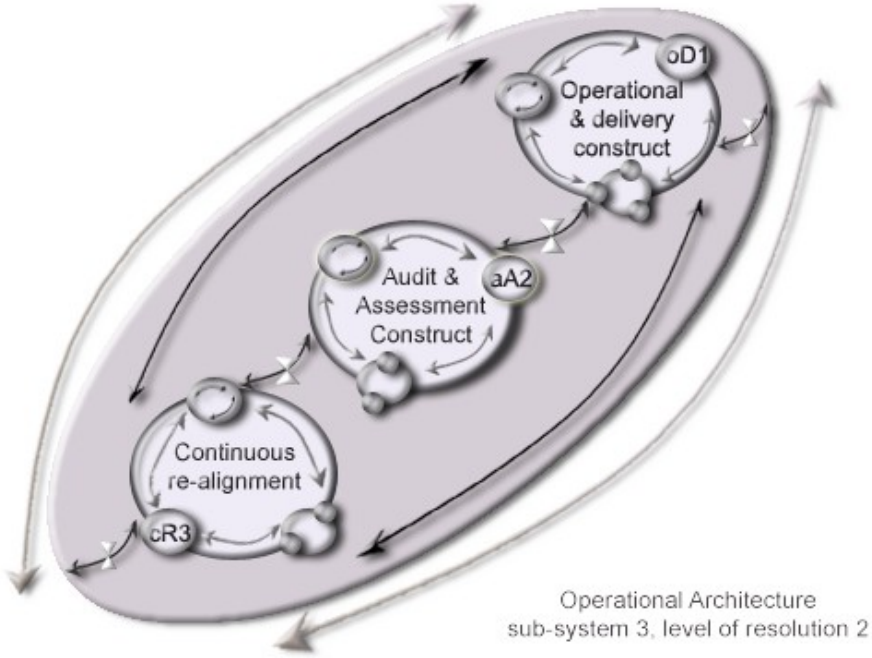

Figure D46: Operational architecture taken from the BAT software

The sub-systems within the Operational Architecture, each contain a number of supporting sub-systems at lower levels of resolution. As an example, the Operating and Delivery construct will contain three key supporting sub-systems (Mapping & Planning, Managing, and Delivery). Thus, as with all the sub-systems within the business architecture model, it forms a vital support mechanisms for the “parent” and “child” sub-systems, appearing at higher and lower levels of resolution. This could be viewed in terms of the sub-systems providing credibility and impetus in achieving the overall purpose to other level of resolution (emergent nature of the architecture).

Operations and Delivery

The first of the three supporting sub-systems is that of the Operations and Delivery construct, and refer to matters of the organisation that lends itself to activity planning, managing and execution and delivery. The Operations and delivery construct is thus a function of Mapping & planning, Managing & directing, and Delivery & execution. The diagram below reflects this construction very clearly and yields the shortened annotation of: “ODC = f(MP x MD x DE)”.

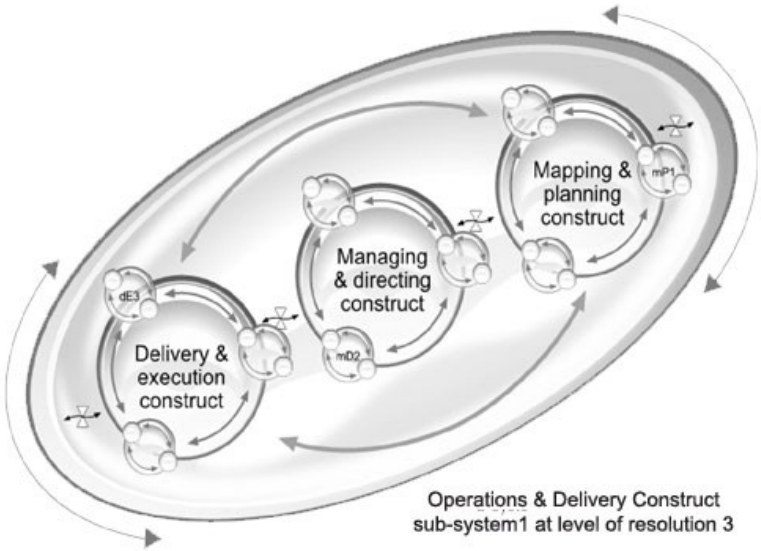

Figure D47: Operations & delivery construct taken from the BAT software

Each of these sub-segments will be examined in some detail hereunder. The inter-relatedness of these sub-systems are made more obvious by way of the diagrammatic representation, providing a sense of the systemic influences and interdependencies contained within the higher level of resolution (Operational & Delivery Construct).

Undertaking any activity requires these three core steps, executing one without the other may never be able to yield the desired results nor be able to give rise to the emergent qualities attained when executing these in concert, as reflected by the diagram below. This great deal of interconnection and interdependency touches on the heart of certainty and our propensity to have predictability and accuracy with everything we undertake, be it on a private or business level. The entire journey is in fact a very probabilistic exercise, thus being open to this reality will ensure we develop plans and actions that can be rapidly changed, based upon the realities and learning from implementation.

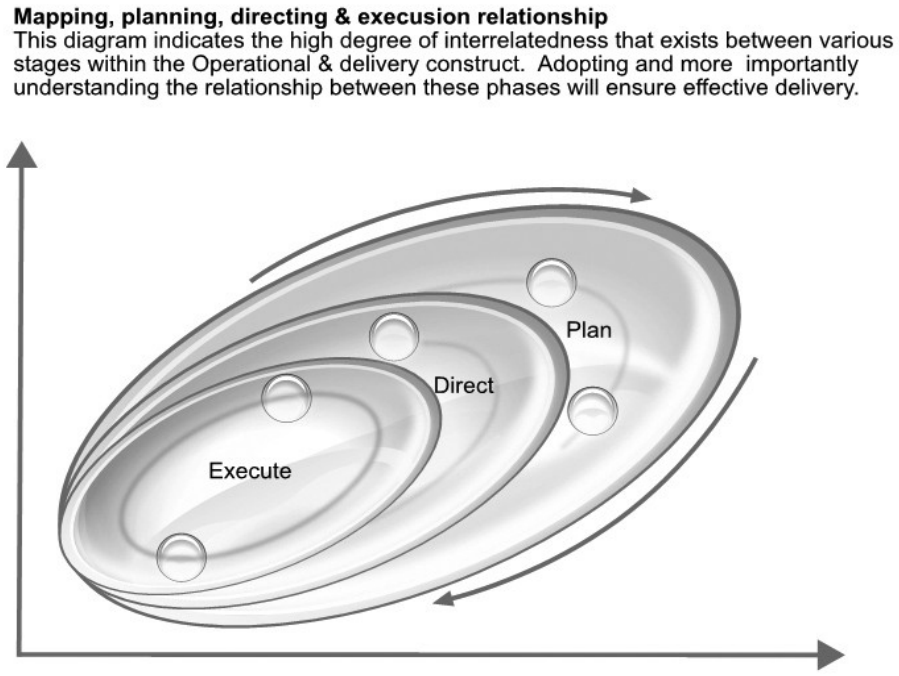

Figure D48: Mapping, planning, directing construct taken from the BAT software

Understanding and appreciating the interdependencies between the planning aspect of operational activities, the management of these activities, as well as the execution thereof, and seeing them as collective is vital. We have to be open to that fact that our best planning is probabilistic (we can only plan 100% if we have full information, and full information is only available after the event has occurred).

Taking this view will ensure timeous delivery, high quality and that solution integrity remains intact, i.e. emergent qualities of the solution. Planning and mapping must not be seen as a once off exercise, but rather an activity that continuously updates and informs the management and execution or delivery, at any level of resolution. Broad considerations within this Operations and Delivery construct, include some of the following:

Quality – to ensure the aspect of quality remains ingrained throughout every aspect of the delivery components. This concept is usually lacking, however the planning, management and execution must ensure the fabric of quality remain woven into all aspects, and should be accommodated from the outset, allowing for the consistency in product output (methodologies, documents, software, commodities, etc).

Relationship blueprints – this refers to ensuring that planning, managing and execution aspects recognise the importance of key relationships that require attention and management. Typically this may include: the capacity of execution or joint venture partner, internal staff isues, client contraints, or any other relevant stakeholder. This is an important function, particularly for complex or long running projects, and considering the Extended Value Chain (EVC), and its implicit assumptions.

Communication – having a clear, consistent and unambiguous communication architecture must be planned, managed and executed with diligence. The communication aspects of the operations remain one of the most vital aspects, and yet are generally afforded the least attention. Misinterpretations of words, concepts and construct often lead to costly mistakes.

Problem definition – to truly understand the deliverables that are expected on any level of granularity, the planning function must ensure that the problem is clearly defined and understood (especially the systemic nature of the problem). This will ensure that a viable, long-term and effective solution will be generated, as opposed to a "quick-fix" which generally only result in temporary symptomatic relief.

Roles and Responsibilities – the various roles and responsibilities must be well articulated and understood by all, outlining core governance structures, reporting lines and accountability for all aspects and stakeholders.

The Operations and Delivery construct can be explained in greater detail by looking at the content that must ideally reside within each of the underlying sub-systems.

Planning and Mapping construct

Taking the first sub-system of the operations and delivery construct requires dealing with the detail that goes into the planning of an activity, event, project or programme. The planning function is an integral part of the Operational Architecture since it provides a map of the way forward. The map serves as a key planning and guiding tool, and provides a platform from which to observe events from a birds-eye-view, observing any proposed changes within a broader context of their systemic impact across the intervention. This sub-system also serves as a tool for learning and aids the organisation by having audit input documentation for baseline changes and related variation orders. Key considerations within the Planning and Mapping exercise include some of the following parameters.

Mapping – the usage of concept maps and sketches greatly enhances observing systemic influences and communications by depicting problems in context of the whole (diagrams and maps contain visual aspects that text documents cannot relay adequately without being studied in great detail).

Journey management – this refers to the concept of ensuring that the planning function must recognise all initiatives as that of a journey, the management of which incorporates, having a champion, executive sponsors, operational heads and all the related management structures within the initiative.

Architectural considerations – a vital consideration throughout the planning and mapping function, as well as the managing and execution functions, relate to the verifying implications it has across the business architecture. This is vital since it feeds into the notion of continuous improvement, and ensure integrated planning having higher probability of success.

Other – other considerations include confirmation of the value proposition; Development of a business case; Authorisation and commitment from relevant stakeholders.

Directing and Managing construct

This sub-system deals with the detail that goes into the directing and managing activities within any given initiative. It can also be seen as being the programme management function, directing and managing all resources in context of the broader goals and strategic objectives.

The key consideration here is to recognise that there are various management techniques and styles, the post important consideration especially in a strong process centric solution, is to recognise the importance of people and the synergies required to develop a good team ethic. Some of the major considerations in this sub-segment would therefore include:

Team dynamics – recognising that teams are comprised of people and that each of them are unique in terms of skills, ability and adaptability must inform the selection criteria for the initiative in terms of the various roles and responsibilities.

Programme management – the programme management function is expected to contain all the necessary control measures inherent in its overall methodology. Key considerations would include: Scoping and planning of the journey; Directing and measure the journey (responsibility matrix, Key reporting areas, Key performance indicators); Planning of the programme, Mobilisation of the programme and stakeholder management.

Delivery and execution construct

The third, and equally important sub-system is concerned with the detailed deliverables and milestones of an initiative. This segment requires sound project management controls and hands-on delivery, and is where great emphasis resides on time and quality management since this is the root or most granular level of resolution. Some of the major considerations in this sub-segment would therefore include:

Time and quality dynamics – since this segment has the most direct interface with the external world (stakeholders other than the organisation). It stands to reason that timeous delivery and the desired quality is foremost. These two constraints are often blamed for the dilemma of having to balance timeous delivery, by compromising on quality. The two aspects does have a strong relationship but the project team must realise that compromising quality is never allowed, even if it implies taking a penalty for late completion. The integrity of quality is thus considered as primary importance (as reflected in the planning phase).

Project management – the principles of basic project management is vital in the delivery and execution segment, and represent one of the best techniques to ensure control over milestones. Key considerations within this segment include: Development of a detailed project plan (project charter, project plans with milestones, etc); confirmation of the execution team; Establish control and management parameters (project steering meetings, reporting lines, etc); Progress and exception reports. The Mapping and planning, Managing, and Delivery construct as explained above can be reflected by the diagram below in terms of a high-level map.

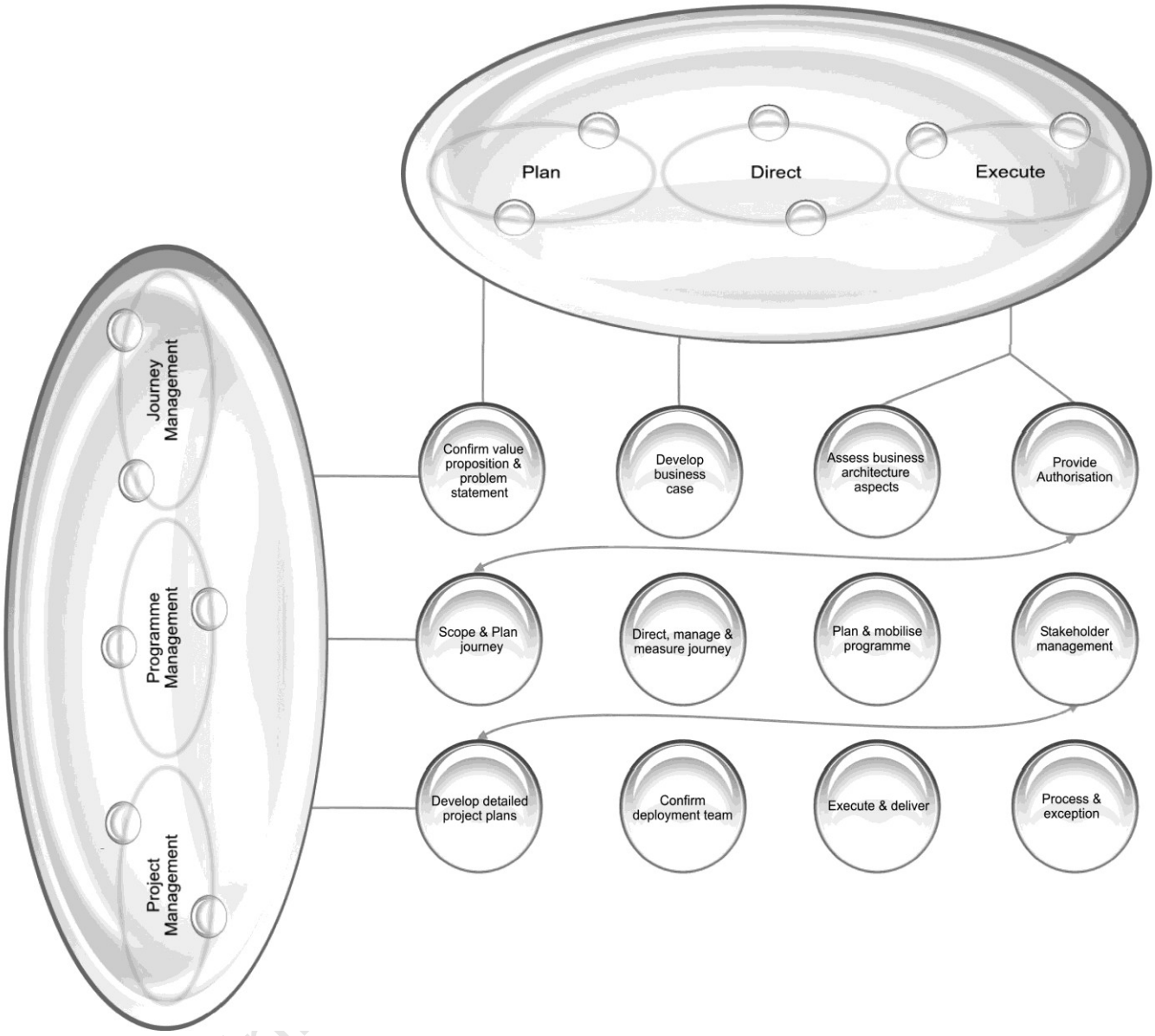

Figure D49: Journey map construct taken from the BAT software

It is must be noted that the journey includes programme management, and project management, thus, so too must planning incorporate managing and executing, both dimensions therefore having a great deal of inter-relatedness.

Audit and Assessment

The second sub-system of Audit and Assessment, refer to the base activities undertaken when fixing operational aspects of the business, be it classified as a programme, a project, or a milestone. It is a function of "conducting an audit or performing an assessment, performing a gap analysis, and Design and Validate the intervention", and expresssed as: "AAC = f(CAA x PGA x DVI)".

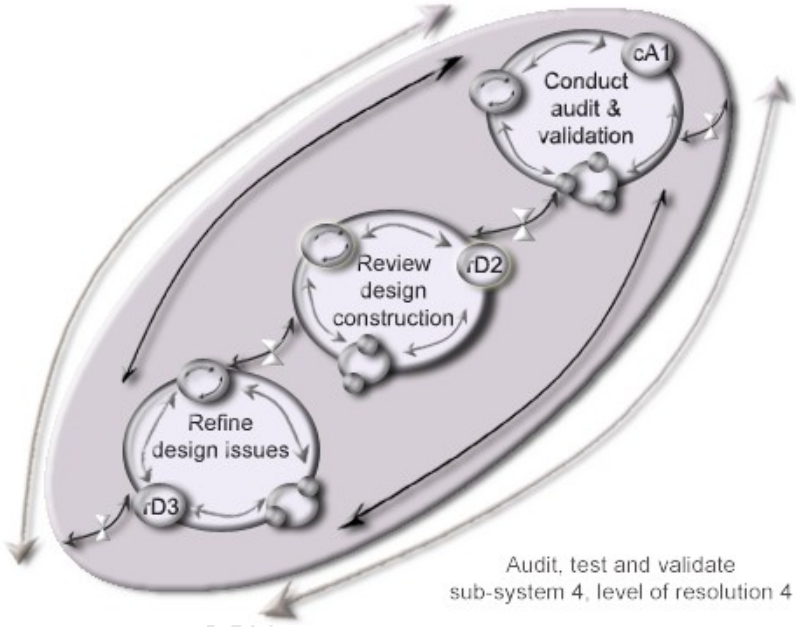

Figure D50: Audit, test & validate construct taken from the BAT software

As mapped out above, this supporting sub-system is in turn comprised of three lower level sub-systems, each of which will be expanded upon below.

Conducting an Audit and Assessment

This sub-system deals with the analysis and review of what the problem is (tendency of ill-structured problems, and not being what has been communicated formally). Often the problem noted and articulated is not truly the root cause but merely a symptom of the real problem. To avoid moving resources into a specific direction in a rushed attempt to solve the problem, it is much wiser to ensure that an audit or assessment is performed. This will yield a more accurate and detailed description of the problem, thereby allowing the crafting of a more robust solution. Ideally the steps involved in such a review process would include: Defining the parameters of the problem (ensuring that the search for the problem is confined); Research (this allows for ensuring that similar problems that have been resolved are tracked and used to save time); Conduct interviews (to obtain comment and guidance from those affected parties); Perform inspection (physical checks and tests if needed); Generate and report findings (a synthesis and summary of comments, findings and preliminary recommendations).

Perform gap analysis

This sub-system deal with the verification of the report and recommendations and establishing the reasoning for the problem, and the gap that exist. The key steps in this segment would involve the following: Verification of audit and assessment report; Vet and review findings (against benchmarks, best practices, historical performance, etc); Perform and document gap analysis.

Plot and validation of the intervention

This sub-system includes the plotting or mapping of the solution, based upon the recommendations as provided by the previous input activity. Typically this will include the following key steps: Plotting and mapping the intervention (crafting of the solution based upon the information generated); Validation (ensuring the appropriateness of the proposed solution before obtaining commitment to implement); Approval and sign-off (official sanction of the proposed solution).

These are the broad key steps that must be performed at this level of resolution (audit and assessment construct). The following phase relates to the implementation of the theoretical solution, and resides in the next level of resolution (Re-alignment and implementation).

Re-Alignment and Implementation

The third major sub-system at this specific level of resolution is that of Re-alignment and implementation. This sub-system refer to activities undertaken when organisations attempt to fix things (implementation). This sub-system could be viewed as the actual implementation of the decisions that has been taken or approved (viewed as a project or sub-project).

Typically the Realignment and implementation can be viewed as a function of Planning the intervention deployment, Implementation, and Verification & continuous enhancement. Written in terms of the models shortened annotation, it would appear as: “RIC = f(PID x I x VCE)”. The diagram below depicts this graphically.

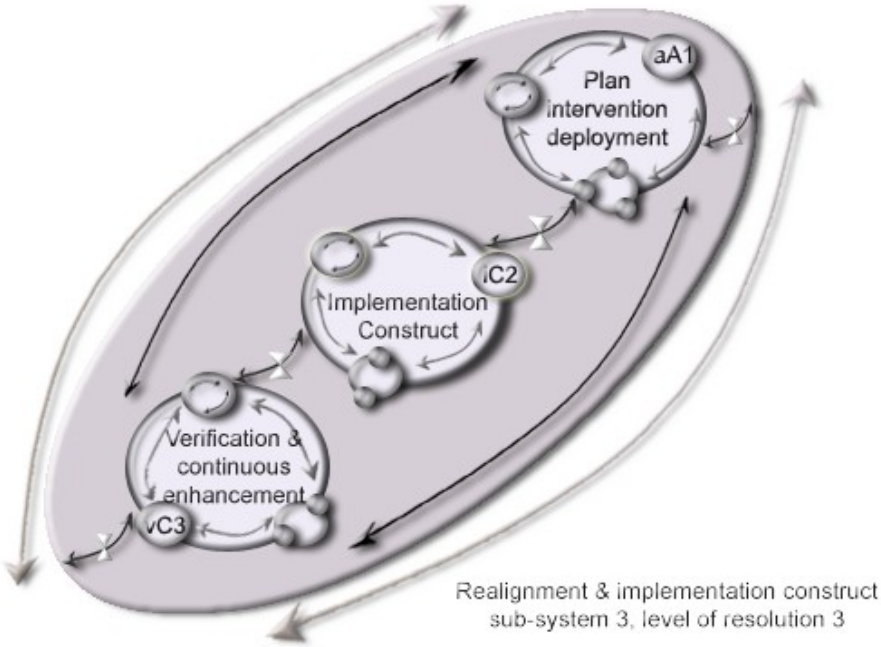

Figure D51: Re-alignment & implementation construct from the BAT software

The diagram displays the supporting sub-systems within this level of resolution, the detail within each which can be expanded depending upon the nature of the intervention or project under consideration. Typically, key steps within these sub-systems would include the following:

Planning of the intervention deployment

This activity pertains to the planning of the execution part of the recommendations and typically requires thought in terms of requirements and related tools for the intervention. Specialised equipment (software, hardware, clothing gear, tools, etc.); Subject Area Experts (knowledge areas); Logistical matters (shutdowns that may be required, procurement lead times); Business impact of the intervention (may require working at night, over weekends, etc), Extended Value Chain (EVC) integration and planning, etc. These are all the considerations that the planning segment needs to accommodate to ensure a seamless implementation.

Implementation construct

This sub-system relates to the actual implementation and deployment, where strong focus need to be directed toward the adoption of sound project management principles in order to adhere to the timelines and quality promised.

Verification and continuous improvement

The last activity within the Re-alignment and implementation construct is that of verification and continuous improvement. The verification aspect is to ensure that the desired outcomes have been achieved, and that the solution works well in the live environment. This sub-system must ensure documentation and reporting are in place, completing the feedback loop.

In some instances, the implemented solution could yield unexpected gains (serendipity), or it may present unforeseen problems, these must then be document and sent back through the process (iterative process of learning and adaptation) until the desired results are attained. The second aspect of continuous improvement relates exactly to this concept of positive and negative feedback loops, to ensure that the "system" remains within the desired parameters. Other key steps in this sub-system include: Verifying results (documenting and informing stakeholders of the outcomes is vital); Ensuring that systemic influences are accommodated and carefully observed.